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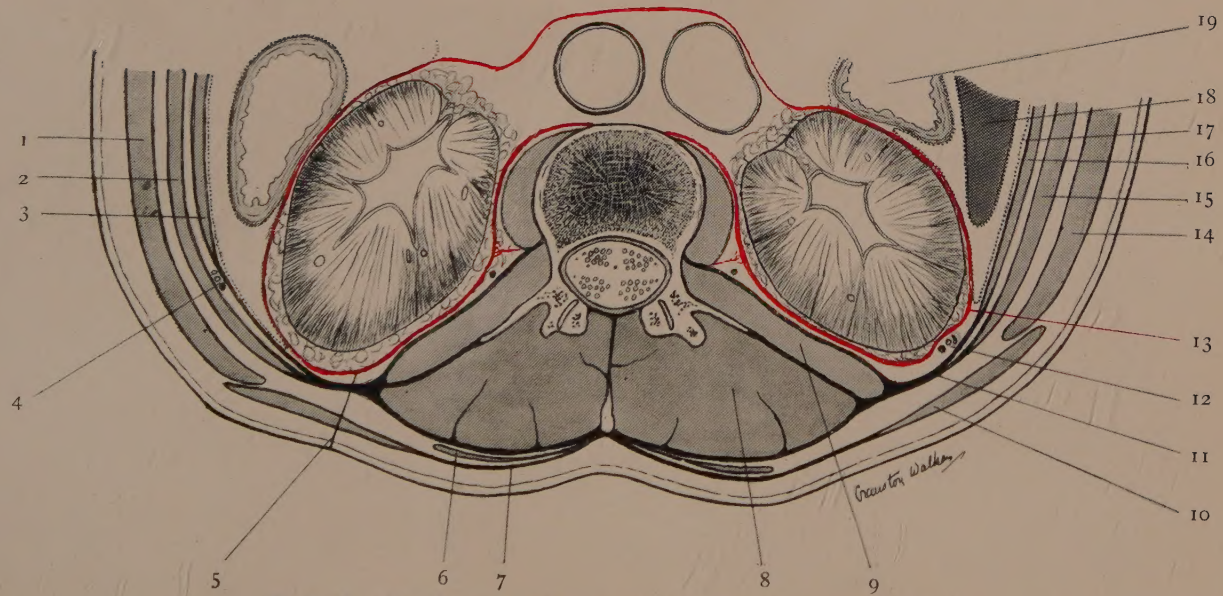

PLATE I.—Attachments and relationships of the perinephric fascia.

1, External oblique; 2, Internal oblique; 3, Transversalis; 4, Last thoracic nerve and vessels; 5, Track of incision; 6, Serratus posticus inferior; 7, Aponeurosis of latissimus dorsi; 8, Erector spinæ; 9, Quadratus lumborum; 10 Latissimus dorsi; 11, Lumbar fascia; 12, Last thoracic nerve and vessels; 13, Perinephric fascia; 14, External oblique; 15, Internal oblique; 16, Transversalis; 17, Peritoneum; 18, Liver; 19, Colon.

MOVABLE KIDNEY

ITS ETIOLOGY, PATHOLOGY DIAGNOSIS, SYMPTOMS AND TREATMENT

BY

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SECOND EDITION

WITH 14 FULL-PAGE PLATES
AND ILLUSTRATIONS IN THE TEXT

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To

MY DEAR WIFE

PREFACE TO THE SECOND EDITION

NINETEEN years have elapsed since the first edition of this book was published. At that time the subject of Movable Kidney actively engaged the attention of the medical profession in this country, in America, and on the Continent. Much controversy existed as to the importance of nephroptosis in the causation of chronic ill-health. By some writers it was held to be a common cause of functional disturbance and lowered efficiency, while others regarded it as of little importance. This controversy cannot even now be regarded as entirely at an end, but the tendency has been for fewer and fewer cases to be treated by operation. This appears to have resulted from failure of the early enthusiasts to justify rather exaggerated assertions as to the importance of the condition and the benefits resulting from its treatment; to faulty technique and failure to remedy associated lesions; and to impatience in awaiting results.

That movable kidney may be responsible for seriously lowered efficiency of mind and body and for widespread and persistent functional disturbance my personal experience has convinced me. I have devoted close attention

to the subject for 25 years, and during that time have operated upon upwards of 1,500 patients. The results have been such as to prove that in carefully selected cases great benefit, and often absolute cure, can be obtained by replacement of abnormally mobile kidneys. The report upon my last series of cases by Professor Kauffmann in the last chapter of the book confirms this statement.

The present edition has been to a large extent rewritten in the light of wider experience, and every effort has been made to present the subject fairly and honestly. No assertions are made which are not fully justified of my own knowledge, and all controversial matter is labelled such. In the proper selection of cases for operation great help may be looked for in the future from pyelography. The technical difficulties in the way of making satisfactory pyelograms with the patient in the erect position has been an obstacle, but when this difficulty has been surmounted the exact information given as to the effect of the displacement upon the kidney pelvis and ureter will be invaluable.

I desire to acknowledge my indebtedness to Dr. Suckling for first directing my attention to the many interesting problems connected with movable kidney. His enthusiasm and wide experience have been most helpful to me, and the results he obtained in his own practice could not fail to impress even the most sceptical observer. My personal experience has gone far to confirm the truth of his teaching.

I am greatly indebted to Dr. Cranston Walker for the original drawings from which several of the plates have been made, and to my colleagues, Mr. B. J. Ward and Dr. Brailsford, for assistance with the pyelograms and photographs. My thanks are also due to my secretary, Miss Maud White, for the valuable help she has given me in the preparation of the book for the Press.

W. Billington.

58, Harborne Road, Edgbaston,
Birmingham.

April, 1929.

CONTENTS

CHAPTER		PAGE
1.	The Position, Relations, and Supports of the Normal Kidneys	1
2.	Visceroptosis and Nephroptosis	9
3.	Frequency and Etiology of Movable Kidney	21
4.	Pathological Changes in Surrounding Structures	34
5.	Pathological Changes in the Kidney	44
6.	General Pathology of Movable Kidney	60
7.	Diagnosis	74
8.	Symptoms: Local	89
9.	Symptoms: General	101
10.	Symptoms: Disturbances of Digestion and Sexual Function	107
11.	Symptoms: Disorders of the Nervous System	117
12.	Treatment of Movable Kidney	135
13.	Nephropexy	148
14.	Results of Nephropexy	161
	References	171
	Index	173

LIST OF PLATES

PLATE

1. Attachments and relationships of the perinephric fascia . . . . . *Frontispiece*

Facing page

2. Recumbent position 76
3. Position of right hand in palpation of left loin. 77
4. Examination of right loin in the lateral position . 78
5. Examination of right loin in the erect position . 79
6. Examination of left loin in the erect position . *Facing Plate* v
7. Pyelogram of right kidney, patient lying down . 81
8. Pyelogram of same kidney as in plate vii, patient erect . . . . . *Facing Plate* vii
9. Posterior nephropexy (author's method). Surgical anatomy 154
10. Fig. 1. Appearance of kidney after the capsular flap has been formed and the Brödel suspensory sutures have been inserted

    Fig. 2. Upper pole of right kidney as seen from above 156
11. Appearance of wound just prior to insertion of skin stitches 157
12. To show the position of the kidney and the arrangement of the capsular flap and suspensory stitches at the close of the operation 158
13. Appearance of wound at end of operation . . 159
14. Scar, six months after operation 160

MOVABLE KIDNEY

CHAPTER I

THE POSITION, RELATIONS, AND SUPPORTS OF THE NORMAL KIDNEYS

Position.—The kidneys are deeply placed in the loins on either side of the vertebral column and behind the peritoneum. They are on a level with the last dorsal and upper two or three lumbar vertebræ, the right kidney being about $\frac{1}{2}$ inch lower than the left. A line drawn horizontally round the body at the level of the umbilicus passes 1 inch below the lower extremity of the right kidney and $1\frac{1}{2}$ inches below that of the left. The upper extremity of the left kidney is on a level with the upper border of the 11th rib, while that of the right only reaches the lower border of the same rib.

Posteriorly, the position of the kidney can be determined by drawing two horizontal lines from the spines of the 11th dorsal and 3rd lumbar vertebræ. These are joined by two vertical lines placed 1 inch and $3\frac{3}{4}$ inches from the middle line. In the parallelogram thus formed the kidney lies obliquely, its upper pole being about 2 inches, and its lower pole $2\frac{1}{2}$ to 3 inches, from the middle line.

At the middle of the inner border of the kidney is the hilum. The renal vessels enter the hilum almost horizontally, while the ureter leaves it obliquely, passing downwards and inwards in the direction of the bladder. The ureter normally skirts the inner edge of the lower half of

the kidney, and a rotation inwards of the lower renal pole tends to obstruct the flow of urine along it. It is important to remember this when operating for mobility of the kidney, and care must be taken to prevent the lower half of the kidney from swinging inwards. It is by no means unusual to find accessory renal arteries passing directly from the aorta to the upper or lower poles of the kidney. They are sometimes of considerable size, and care is needed to avoid injury to them when freeing the kidney from adhesions. Should they be accidentally divided troublesome bleeding results, and difficulty is experienced in securing the proximal end owing to its tendency to retract deeply into the loose areolar tissue surrounding the kidney. Such an artery passing to the tail of the kidney may cause kinking of the ureter and hydronephrosis. This accident is very likely to occur if the kidney descends from its normal position. Accessory arteries going to the upper pole rarely interfere with satisfactory replacement of a dislocated kidney, and can be preserved; but those going to the lower pole should be divided between two ligatures if they interfere with replacement or kink the ureter. A limited amount of infarction follows, but no ill effects occur.

The position of the normal kidney with reference to the last rib is important in that it furnishes a useful guide to the level at which the kidney should be put when operating from the back. Professor Arthur Robinson demonstrated to me in formalin-hardened bodies that the angle formed by the outer edge of the erector spinæ muscle and the lower border of the last rib is on a line passing from the centre of the hilum to the centre of the convex border of the right kidney. Knowing this, it is quite easy to secure the kidney at its exact normal level. It is important to remember that although this angle is constant, it bears no definite relationship to the free extremity of the rib. The length of the last rib is very variable, and its tip may be at or some distance in front of the angle. This variability in length of the rib

is important in that failure to take it into account may endanger the pleura when making the puncture for the passage of the capsular flap. This puncture should be made through the 11th intercostal space just in front of the outer edge of the erector spinæ muscle, the position of the tip of the last rib being ignored. If the rib does not reach the outer edge of the erector spinæ, it is represented by the external arcuate ligament, and it is immaterial whether the capsular flap passes over rib or ligament.

Relations.—The posterior relations of both kidneys are practically the same. Each kidney rests upon the last rib, the diaphragm, the anterior layer of the lumbar fascia covering the quadratus lumborum muscle, and to a slight extent upon the psoas muscle. The 11th rib is also a posterior relation to the left kidney. Passing obliquely behind the kidney are the last dorsal and ilio-inguinal nerves. These nerves are frequently seen when exposing the kidney from the back, and must be carefully preserved. The posterior surface of the kidney is entirely uncovered by peritoneum, and is separated from the structures enumerated by a thick layer of fat enclosed by fascia. The pleura is not a direct posterior relation of the kidney, being separated from it by the diaphragm. It is, however, important to remember its position when performing nephropexy. Usually the pleura does not extend below the lower border of the last rib, and for 1½ inches from the tip terminates at or above the upper border (*see* Plate IX). In some cases, however, the pleura extends lower, and is then in danger of being wounded. With ordinary care it is possible to pass a blunt instrument, such as a closed curved Spencer Wells forceps, through the 11th intercostal space and between the rib and the pleura without damaging the latter. The only precautions necessary are to use a curved blunt instrument, to keep close to the rib, and to make the puncture not less than ¾ inch in front of the outer edge of the erector spinæ muscle. I have executed this manœuvre

upwards of two thousand times, and have only opened the pleura on three or four occasions. No ill effects have followed such accidental puncture, the occurrence of which is at once indicated by the hissing of air as it passes into the pleural cavity. Should this accident occur, the capsular flap practically closes the hole in the pleura when turned over the rib. On one occasion I was rung up two days after the operation by the doctor in charge who was alarmed because, although the patient seemed quite well and in no distress, he was unable to feel the apex beat or to obtain cardiac dullness on percussion.

The anterior relations of the kidneys are different on the two sides. The anterior surface of the right kidney is covered on its upper and outer part by peritoneum which separates it from the right lobe of the liver. Over the hilum and inner border lies the duodenum, while in contact with the lower part of the anterior surface is the hepatic flexure of the colon. Both these portions of intestine are uncovered by peritoneum posteriorly, and sometimes are very closely attached to the kidney. This relationship of the duodenum and the colon to the right kidney explains the mobilization of them which so often occurs when the kidney acquires abnormal mobility with resultant duodenal stasis and sagging of the hepatic flexure of the colon, the ascending colon and the cæcum. The second stage of the duodenum may move with the kidney and become definitely obstructed. The obstruction, however, is a postural one, and is relieved by lying down or by adequate support of the kidney. It is responsible for some of the digestive disturbances that so often characterize renal mobility, but differs from real duodenal obstruction in that relief is at once obtained by recumbency. The effect of manipulation of a loose right kidney upon the duodenum can be readily demonstrated when the abdomen is opened. It is not, however, appreciated unless looked for owing to the drag of the kidney being relaxed when the patient is lying

in a horizontal position. On the left side the pancreas and splenic vessels cross the anterior surface of the kidney just above the hilum. This area is uncovered by peritoneum, but above and below it the peritoneum separates the kidney from the stomach and intestines respectively. The descending colon is only in contact with the anterior surface of the left kidney over a small area at its lower and outer part.

The renal supports.—The kidneys lie in the deep vertebral recesses or renal pouches on either side of the spine. These recesses are closed above by the diaphragm, and posteriorly and externally by the muscles of the back and loin. Displacement of the kidney upwards, backwards, or outwards is impossible. Internally, the vertebral column forms a ridge which prevents primary inwards displacement. If, however, the kidney is already displaced forwards and downwards, it may slide over the spine and pass beyond the middle line. Below, the arrangement of the renal fossæ differs materially in the two sexes. In men they are deep and narrow, while in women they are broad and shallow. Descent of the kidneys can, therefore, take place much more readily in women than in men.

In the renal fossæ the kidneys lie in a special fascial compartment, the arrangement of which has an important bearing upon the question of nephroptosis (*see* Plate I). This perinephric fascia is separated from the transversalis muscle behind and the peritoneum in front by loose fat, which is more abundant posteriorly. The perinephric fascia encloses a cavity much more spacious than is required to accommodate the kidney, which lies loosely within it surrounded by a variable amount of fat. The fat which thus envelops the kidney, and is in turn enclosed by the perinephric fascia, is termed the fatty capsule of the kidney. It adapts the kidney to the space in which it moves with each respiration, and protects it from shocks and undue compression during variations of intra-abdominal pressure.

Under normal conditions the fat is very loosely attached to the true kidney capsule, and enucleation is quite easy. When, however, the kidney is unduly mobile the fat is to a large extent replaced by thin, sheet-like adhesions passing between the perinephric fascia and the true capsule, and these tend to limit excessive excursions of the kidney.

The perinephric fascia is formed by two fibrous sheets, anterior and posterior. The posterior layer is attached internally to the bodies of the lumbar vertebræ just internal to the psoas muscle. It passes outwards as a thick, well-defined sheet between the kidney in front and the anterior layer of the lumbar aponeurosis behind. Curling round the outer margin of the kidney, it becomes continuous with the anterior layer. The anterior layer is thinner, passes between the kidney and the peritoneum, crosses the aorta and vena cava, and fuses with its fellow of the opposite side. Traced upwards, both layers fuse firmly at the upper pole of the kidney, completely closing the perirenal space. Higher still the layers again divide to enclose the suprarenal bodies in a separate fascial compartment. This explains the rarity with which the suprarenal accompanies the kidney when the latter acquires abnormal mobility. Downwards, the two layers come into apposition at some little distance below the lower pole of the kidney. They do not fuse, however, and can readily be forced apart, opposing but little resistance to descent of the kidney.

Two points in connexion with the lower part of the perinephric capsule are of importance. The two layers, attached internally to the vertebral bodies and continuous with one another externally, form a potential tube, which is directed downwards and inwards towards the sacro-iliac synchondrosis. Along this tube the kidney must descend, and in doing so its long axis is altered, being directed downwards and inwards instead of downwards and outwards. In other words, descent is associated with internal rotation of the lower pole, with a resulting tendency to compress the

ureter. In the second place, while the ureter is free to follow the kidney in its excursions in the upper part of the fascial space, lower down it becomes firmly attached to the anterior layer. If the hilum of the kidney falls below the level at which this attachment occurs, a kink will develop and the outflow of urine be obstructed. So long as the kidney is freely movable, the kink will only occur intermittently, and the obstruction be transient; but should the kidney become fixed much below its normal level, the kink may be made permanent and hydronephrosis develop. This is an important reason for raising the kidney as nearly as possible to its normal level when operating for mobility.

The external attachments of the perinephric fascia require notice. As already stated, its posterior layer is firmly attached internally to the vertebral bodies. Passing from its upper end in an upwards and inward direction is a strong, fibrous band which is partly continued into the diaphragmatic fascia and is partly attached to the spinal column. This band is sometimes erroneously called the "suspensory ligament of the kidney." It does support the perirenal capsule, but cannot prevent descent of the kidney within that capsule, and so has but little or no direct action in suspending the kidney itself. Posteriorly, a thin, fibrous sheet passes from the perinephric fascia to the interval between the psoas and quadratus lumborum muscles, and blends with the periosteum on the lateral aspect of the bodies of the lumbar vertebræ.

It will thus be seen that, while the perinephric fascia is firmly held by strong supports, there is but little to prevent descent of the kidney within the capsule. In the less marked cases of renal mobility, movement takes place entirely within the perirenal fascial compartment, but when the excursions of the kidney are more extensive the capsule becomes dragged upon, and its supports stretched, and to some extent it participates in these excursions.

The main factors which retain the kidney in its normal

position appear to be (1) the maintenance of normal intra-abdominal pressure by adequate muscular tone; (2) the vessels which form the renal pedicle; and (3) the support afforded by the perirenal fatty capsule. Of these, by far the most important is the first. The support afforded by the muscles of the back and abdominal wall is all-important, and without it some descent of the kidney is inevitable. The renal pedicle opposes some resistance, but under frequent strain yields and becomes elongated, sometimes to the extent of several inches. Undue importance has been attached to fat both within and without the perirenal fascia. At most it can only be regarded as loose packing protecting the kidney from shocks. Its function is that of the straw in wooden crates in which crockery is packed. Without the firm support of enclosing muscles it can have little effect in preventing dislocation of the kidney, and in fact it is removed and replaced by loose fibrous tissue when the kidney begins to descend. Disappearance of fat round the kidney seems to be a sequence and not the cause of nephroptosis. As it becomes loose, ivylike tendrils or adhesions form between the true kidney capsule and the perirenal fascia, the object apparently being to restrain descent, but with only partial success, movement being checked, not prevented. In time the fascia itself, though strongly supported, yields, and in part follows the excursions of the kidney. Once, therefore, displaced from its normal position and removed from the influence of the muscles which tend to keep it in place, there is nothing that will effectually prevent further descent. A careful consideration of these anatomical factors makes untenable the contention of those who assert that by increasing the amount of perinephric fat it is possible to restore a movable kidney to its normal position and keep it there. The fallacy of such a supposition is abundantly demonstrated by clinical experience.

CHAPTER II

VISCEROPTOSIS AND NEPHROPTOSIS

The kidneys, although not abdominal organs, are situated below the diaphragm and are affected by the same physical conditions as the intra-peritoneal subdiaphragmatic viscera. For this reason they are frequently found to participate in the general sagging of the abdominal viscera to which the term *visceroptosis* has been applied. When the prolapse of the kidneys is proportionate to that of the subdiaphragmatic organs generally, it calls for no special notice and is covered by the wider term descriptive of the general condition of ptosis. When, however, prolapse of the kidneys occurs alone or appreciably in excess of the other viscera, the term *nephroptosis* is applied to it.

VISCEROPTOSIS

Any or all of the organs situated below the diaphragm may be found below their normal level when the body is in the erect position, the assumption of which by the human race is the basal responsible factor. The predisposing causes are congenital laxity of the visceral supports, weakness of the abdominal muscles, and downward pressure upon the subdiaphragmatic organs from habitual faulty posture, and clothing which constricts or drags upon the waist. When the degree of prolapse is appreciable, the term visceroptosis has been applied to the condition, and it is now recognized that serious disturbance of function may result from it. A useful division into congenital and acquired types may be made.

Congenital visceroptosis.—Congenital visceroptosis is met with among the physically degenerate, and results from defective development. The sufferers from it have never at any time been normal and in this respect differ from the victims of acquired visceroptosis, the latter at one period of their life having enjoyed ordinary health. Congenital visceroptosis, whether the kidneys are involved or not, cannot be remedied by surgical measures. Its treatment must be on general lines, must begin early, and must be continued during the whole period of evolution from childhood to adult life.

Acquired visceroptosis.—Acquired visceroptosis in varying degree is very common, especially amongst women, and if estimated by some undue prominence below the umbilicus is almost universal in women over thirty years of age. It has even been asserted that the statue of Venus of Milo demonstrates its existence in mild degree. This form of visceroptosis is most marked in women who have borne many children and whose abdominal walls are lax and pendulous. In the erect position the bowels fall into the lower abdomen, and practically every organ below the diaphragm assumes a lower level than normal. In this general descent the kidneys participate, though often to only a moderate extent. The symptoms are rarely severe and the general health is but little affected. All the treatment required is support by suitable belts or corsets, correction of errors of dress, and exercises to strengthen the abdominal muscles.

In rare instances general ptosis of the intra-abdominal organs and of the kidneys is associated with severe symptoms of neurasthenia and local kidney disturbances such as Dietl's crises. Glénard's classical description of this condition has led to its being known as *Glénard's Disease*. Cases to which this term can accurately be applied are uncommon, and I do not see more than two or three examples in a year.

A third and very important group of cases is that in

which there is not much enteroptosis, and yet the associated symptoms are so severe as to reduce the sufferers to a state of chronic invalidism. Patients are for the most part unmarried, and, if married, have had fewer children than is the average. They have at one time been normal, are comparatively young when the symptoms begin, are organically sound, and usually have a good family history. Rest alone seems to do them any real good, and the benefit obtained lasts only so long as they are resting. In the majority of these cases examination reveals ptosis of one or both kidneys.

An analysis of the varieties of visceroptosis leads to a distinction being made between the kidneys and the intra-abdominal viscera. The kidneys are situated outside the peritoneum, and developmentally and anatomically are not abdominal organs. Enteroptosis and nephroptosis are separate conditions, though subject largely to the same laws. They are usually associated to some extent, but only in Glénard's disease, which is comparatively rare, is this association a complete one. Usually either nephroptosis and the symptoms to which it gives rise are predominant, and the associated enteroptosis is of little account, or the enteroptosis is the principal trouble and the nephroptosis unimportant. This distinction is of importance from the point of view of treatment. When nephroptosis is the predominant condition, general external support of the abdomen is unsatisfactory, and special mechanical contrivances for the support of the kidneys or nephropexy is indicated. For enteroptosis, corsets, etc., give good results and nephropexy is inadvisable.

NEPHROPTOSIS, OR DISLOCATED KIDNEY

To use the qualification "movable" in reference to the kidney as indicative of a pathological condition is misleading. It is now generally accepted that normal kidneys participate in the respiratory excursions of the other

subdiaphragmatic organs, and that such movement is in no sense pathological. It would be far better to describe pathologically displaced kidneys as *dislocated* rather than as movable, "dropped," or prolapsed. The term much more accurately defines the condition, and indicates the lines on which treatment should proceed. The treatment for dislocated kidney should be that applied to dislocated bones, that is, restoration of position and function. It thus becomes of great importance to distinguish between normal and pathological mobility of the kidneys.

Normal movement of the kidney.—The normal respiratory range of movement of the kidney has been variously estimated, but probably ½ to 1 inch (Treves) is about correct. The range of movement can, however, be considerably increased by deep breathing. The right kidney moves more freely with respiration than the left, probably because the movements of the diaphragm are more directly transmitted to it through the liver, which descends into the right renal pouch with each inspiration.

It has been stated that a kidney which is palpable is pathologically movable, and in most classifications the term "palpable" is applied to the group in which the mobility is so slight that the kidney can only just be felt. While clinically it is probably correct to assume that a kidney which can be felt possesses some abnormal mobility, the assumption is not wholly justified. In health, the lower half or two-thirds of the kidney projects below the last rib, and, given a person with a sufficiently thin loin, it is quite possible to palpate the lower pole of the normal kidney. Neither the fact, then, that the kidney can be felt, nor that it moves with respiration, can be taken as certain evidence of abnormal mobility.

Tests for abnormal movement of kidneys.—The position of a perfectly normal kidney is not influenced by gravity, and its level is the same when the body is erect as when supine. This fact is of considerable clinical value

in that it is easy to ascertain. If a kidney assumes a definitely lower level with the patient standing up, it is safe to deduce pathological mobility. Another test of abnormal mobility when the kidney is palpable is to see whether it can be prevented from moving upwards with expiration. On several occasions, when exploring a normally placed kidney for stone, I have observed that unless great resistance is opposed, the kidney cannot be prevented from ascending with each expiration, even though the bared lower pole is held between the thumb and finger. Neither is it possible by the use of reasonable force to push the kidney to a higher level than that to which it is carried by respiratory movement. In other words, the normal kidney has no up-and-down movement beyond that caused by changes in the position of the diaphragm. Clinically, this test can be readily applied. The patient is placed on a couch of convenient height, with the shoulders raised, and the loin examined in the way described in the chapter on Diagnosis. If the kidney is palpable the lower pole will descend between the thumb and index finger, and if there is undue mobility it can be held and prevented from ascending with the succeeding expiration. If, however, there is no abnormal mobility, the lower pole, though it may be felt, cannot be held.

A kidney may, therefore, be said clinically to possess abnormal mobility (1) when it drops to a lower level on the assumption of the erect position, and (2) when the lower pole can not only be felt, but held between the examiner's thumb and finger.

Rotation of the kidney.—It must not be assumed that because a kidney cannot be palpated it is necessarily in its normal position. Rotation of the kidney within the perinephric capsule, and without appreciable descent, occasionally occurs. Such a kidney may cause severe symptoms, and yet not be palpable. This was strikingly demonstrated to me by the case of a young man, aged 27,

upon whom I was about to perform right-sided nephropexy for profound neurasthenia. The right kidney was very movable, but the left kidney could not be palpated. The man, however, insisted that he suffered more discomfort on the left side than the right, and urgently asked that fixation of the right kidney should be followed by an examination of the left. With considerable reluctance I agreed to do this, feeling that it was justifiable if only to appease the patient's anxiety with regard to his left kidney.

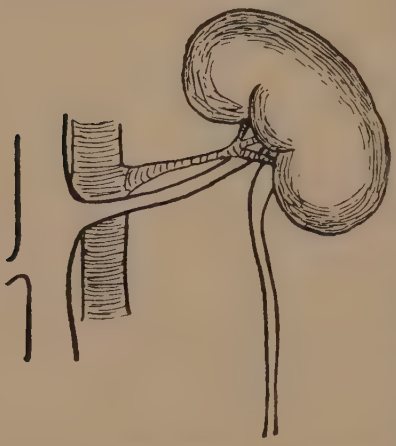

Fig. 1.—Normal kidney. (*Suckling.*)

On opening the loin I was surprised to find that the kidney was absent from its normal situation, and after some search discovered that it was displaced inwards behind the stomach. The lower pole was rotated inwards and forwards, and the hilum was directed upwards, forwards and to the right. Not only was there no descent, but the kidney lay, with its vertical axis almost horizontal, at a higher level than normal. It was freed with some difficulty, owing to its high position and numerous fibrous adhesions, and brought back into the loin, where it was retained by two silkworm-gut sutures introduced beneath the capsule covering the lower pole, and brought out through the muscles and skin of the back. On another occasion, during the War, an officer

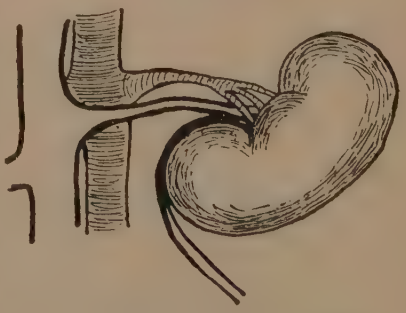

Fig. 2.—Rotated kidney. (*Suckling.*)

was placed under my care, complaining that slight exertion brought on severe crippling pain in the right loin. He was a powerfully built muscular man, and in civil life was a mining engineer in South Africa. His disability dated from an accident in France, when he was thrown heavily from his horse on to frozen ground. This was followed by severe pain in his back and hæmaturia, for which he was sent into hospital. After this, although feeling perfectly well while lying in bed or moving about quietly, the pain came on if he exerted himself to more than a moderate degree. A most exhaustive investigation, comprising physical examination of the loin, repeated X-ray examinations, and examination of his bladder with a cystoscope, and repeated examinations of the urine, failed to reveal anything abnormal. He was put on clerical work. At the termination of the War, before being demobilized, he came to see me again and implored me to explore his loin, stating that unless he could obtain relief from the pain, it was useless for him to return to his old occupation, as he would be unable to do the work it involved. I consented, and found the kidney high up under the diaphragm with its lower pole rotated inwards, as in the previous case. He made a good recovery and returned to South Africa, and subsequently wrote saying that he had resumed his work and had had no recurrence of the pain.

Rotation of the kidney, with but little or no descent, appears to be more common in men than in women, and to be caused by a violent muscular wrench or a direct injury to the back. The connexions between the upper pole of the kidney and the perinephric fascia are normally firmer than those at the lower pole. Further, the lower pole is less protected from muscular action and external violence than the upper. For these reasons displacement of the lower pole occurs more readily, and the result is a rotation of the kidney around its horizontal axis, the lower end travelling inwards and tending to come forwards. The fact

that men are more exposed to sudden strains and external injuries, and that the male renal fossa is narrower than the female, and so opposes more obstacles to descent of the kidney, probably accounts for the greater frequency of high rotated kidney in men than in women. On three or four occasions I have found the kidney hydronephrotic and have removed it. The hydronephrosis had not caused enlargement of the kidney, and was apparently due to kinking of the ureter from the displaced lower pole.

Mechanism of displacement.—Ordinarily a kidney, as it becomes loose, forces its way into the lower part of the perinephric space, which is occupied by fat. The anterior and posterior layers of the perinephric fascia are attached internally to the vertebral column and externally are continuous with one another. They thus form a fascial tube which leads downwards and inwards from the loin. The descending kidney is guided by this tube downwards and inwards, and the pressure of the fascial walls causes the lower pole to rotate inwards, so that its long axis becomes directed downwards and inwards instead of downwards and outwards. This rotation is aided by the pull of the renal pedicle, which tends to make the moving kidney describe the arc of a circle whose radius is the pedicle. Further, inasmuch as the renal fossa becomes shallower in its lower part, the lower pole of the kidney is directed forwards. At the same time a rotation round the vertical axis of the kidney occurs, the inner margin turning forwards. As a result of these various movements the hilum comes to look upwards, inwards, and forwards.

In the male the lower part of the renal fossa is deep and narrow. The descending kidney, therefore, meets with more resistance and is directed forwards at an earlier stage than in the female. In men it is not at all uncommon to find a kidney lying near the outer edge of the rectus muscle without its lower pole having dropped below the level of the umbilicus.

There is practically no limit to the extent to which a kidney may descend, except the natural boundaries of the abdominal cavity. It is not at all unusual to find the kidney in the iliac fossa, and it may even find a resting place within the cavity of the true pelvis. In mild cases, where the abnormal mobility does not exceed 2 or 3 inches, movement takes place within the perinephric fascia without the latter being materially dragged upon. Further descent generally implies some dragging upon the fascial capsule, the attachments of which, though firm, gradually yield under the repeated strain and allow the capsule to follow the kidney in its more extensive excursions. My experience bears out Newman's contention that the perinephric capsule may, and not infrequently does, drop with the kidney. The renal pedicle exercises great restraint at first, but in turn gradually yields and becomes elongated, sometimes to the extent of several inches. Before the kidney can assume the characteristics of what has been termed "floating kidney"—i.e. one which can be moved freely from side to side as well as up and down—the peritoneum which lines the renal pouch of the peritoneal cavity, and which is intimately connected with the anterior layer of the perinephric fascia, must become loosened. This it may do to such an extent as to form a species of false mesonephron or kidney mesentery. When operating upon very loose kidneys, it is well to bear this fact in mind, and to remember that the kidney may be partially surrounded by the peritoneum, which lies as a loose pouch on its outer side, and to some extent behind it. Unless care is exercised and the perinephric compartment opened far back, this peritoneal pouch will be opened. The same accident may occur while tearing away the loose fat between the muscles of the back and the perinephric fascia as a preliminary to incising the latter.

Instances of true floating kidney have been recorded, and much has been written about the condition. It is a

congenital abnormality, the kidney being completely invested by the peritoneum and provided with a perfect mesentery. Such a phenomenon is of more interest to the anatomist than to the surgeon, on account of its great rarity. Practically, no matter how movable a kidney may be, it can be exposed from the loin without the peritoneal cavity being opened, although, as stated above, such an accident may very easily happen unless the precaution be taken to incise the perinephric fascia far back.

Prolapse of one or both kidneys may occur without appreciable displacement of the intra-abdominal viscera. In almost all cases, however, the hepatic flexure and ascending colon are found to have sagged downwards when the right kidney drops, and it is not at all unusual to find the cæcum in the pelvis. This has led to the assumption that the kidney is dragged down by the prolapsed colon and cæcum which often contain excess of fæcal matter. It is, however, much more probable that descent of the kidney is the primary event, and that prolapse of the colon occurs secondarily. As already described, the kidney in its descent passes inwards behind the colon and mobilizes it, so facilitating its descent. If, as seems probable, prolapse of the right kidney alone not infrequently precedes general visceroptosis, nephropexy may arrest the process, even though the colon, stomach, and small intestines may have started on their downward course. Not only does the operation remove the downward drag of the kidney upon the peritoneum, colon, and duodenum, but it is almost always followed by an improvement in the patient's general condition and the tone of the abdominal muscles.

Classification of movable or dislocated kidney.—It will have been gathered from what has already been said that the ordinary nomenclature used to classify renal mobility is very unsatisfactory. The terms "palpable," "movable," and "floating" are vague and misleading.

A palpable kidney is not necessarily abnormally movable. All kidneys are movable with respiration, and if the term is used in reference to pathological mobility only, it covers the whole condition. To define a movable kidney as one possessing a certain range of mobility is absurd. Finally, true floating kidney is an anatomical curiosity and is of but little clinical importance.

A practical classification, and one which is perhaps most generally useful, is that suggested by Wilson and Howell. It is based upon the characteristics which distinguish the kidney in the various stages of descent. As we have seen, simple prolapse in a vertical direction is the first stage. Such a kidney moves freely up and down with respiration, but assumes a lower level in the erect position. Further descent is associated with internal rotation of the lower pole. In this stage the kidney may be entirely below the ribs when the patient stands up, but tends to resume its normal position during recumbency. In the final stage the kidney is at a still lower level. Its lower pole is rotated inwards, and the whole kidney has undergone anterior displacement. It is uninfluenced by respiration, shows no particular tendency to fall back into the loin when the patient lies down, and can be moved freely from side to side. Usually the kidney is freely movable in all three stages, but it may become fixed by impaction or the formation of perirenal adhesions. It is then difficult to distinguish from a congenitally misplaced kidney. The latter condition, however, causes no trouble, while the former is generally attended by severe local symptoms.

Finally, the rotated kidney, with little or no prolapse, must be included in the classification.

We thus arrange displaced kidneys in four classes, according to the nature of the displacement :—

1. Simple prolapse of the kidney.
2. Prolapse, with internal rotation of the lower pole.

3. Prolapse, with rotation inwards and forwards of the lower pole. The kidney is freely movable laterally, and is not influenced by the movements of the diaphragm.
4. Rotation, with little or no prolapse. Such a kidney may not be palpable.

CHAPTER III

FREQUENCY AND ETIOLOGY OF MOVABLE KIDNEY

FREQUENCY

It is very difficult to obtain really reliable evidence as to the frequency of movable kidney, and the estimates of the many writers upon the subject differ widely. Glénard gives 22 per cent., Kuttner and Lindner 20 per cent., Morris 7 per cent. Goelet found one or both kidneys movable in 33 per cent. of the women attending his gynæcological clinic; while Suckling states that the condition was present in 40 per cent. of the women and 6 per cent. of the men in his private practice. Hector Mackenzie stated that he systematically examined 4,000 out-patients attending St. Thomas's Hospital and the Brompton Hospital for Consumption and Diseases of the Chest. Renal mobility was present in 18·4 per cent. of women and 1 per cent. of men. Thomson-Walker states that movable kidney exists in 5 to 10 per cent. of women and from $\frac{1}{2}$ to 1 per cent. of men.

The high percentage of cases of movable kidney recorded by Suckling and Goelet is probably accounted for by the nature of their practice. Suckling is a neurologist and Goelet a gynæcologist. Presumably the patients coming under their notice suffered from symptoms referable to the nervous system or pelvic organs of sufficient severity to impel them to seek expert advice. Functional disturbances of the nervous system and pelvic organs are very commonly associated with renal mobility, a fact which explains the

frequency with which these two observers discovered the condition in their patients.

Though unable to supply any exact statistics, my own experience leads me to believe that pathological mobility of the kidneys is not very common among healthy women. As a general surgeon, I have had frequent opportunities of examining women coming under my care with purely local troubles and in good general health. In many of these the right kidney could be palpated, but could in no sense be regarded as unduly mobile. The hand could not be passed above the top of the kidney in more than about 5 per cent. Among patients suffering from neurasthenia and functional digestive disturbances the percentage was very much higher, rising to somewhere between 30 and 40 per cent.

A careful examination of published statistics, together with my own experience, has convinced me that movable kidney is less common among the general community than at first sight appears. Among the ailing and weakly, who are constantly in need of medical aid, it is far more often met with. The natural inference to draw from this is that the frequent association of movable kidney with certain groups of symptoms cannot be purely accidental, but is rather of the nature of cause and effect.

All observers are agreed that movable kidney is much more common among women than men. Suckling states that he discovered renal mobility in 6 per cent. of men and 40 per cent. of women, a proportion of about 1 to 7; Mackenzie's statistics give a proportion of about 1 to 18·4. In my own experience, out of 200 consecutive cases of nephroptosis in my private practice, 29 were men and 171 were women, while in two series of patients operated upon the proportions were as follows: In a series of 230 cases, 26 were men and 204 women; and in a second series of 164 cases, 12 were men and 152 women. Taken together, these statistics show that out of 594 cases, 67 were men and 527 women, or a proportion of about 1 to $8\frac{1}{2}$.

Displacement of the right kidney alone is more often seen than displacement of the left alone. Sir Arthur Keith ingeniously explains this on anatomical grounds. The right renal fossa is roofed in by the solid liver, which directly communicates to the kidney the downward pressure of the diaphragm. Should the right subdiaphragmatic space be diminished by any cause, such as tight-lacing, the liver is pressed down and the kidney forced out. On the left side the subdiaphragmatic space is occupied by the smaller spleen and the hollow stomach and colon. Here increased pressure affects the kidney to a much less extent, and results in extrusion of the stomach and colon as a primary event.

Marked prolapse of one kidney is generally associated with some dropping of the other. Mobility of both kidneys, though unequal in degree, is more common than statistics would seem to indicate. The error is caused by neglect on the part of the observer to examine the patient in an erect position. It has frequently happened that I have been unable to palpate the left kidney with the patient lying down, when on standing up it has fallen entirely below the ribs. Mackenzie states that of 515 cases of movable kidney examined by him, the right kidney alone was affected in 465, both kidneys in 49, and the left kidney alone in one case only. Of 594 cases investigated by myself, the right kidney alone was movable in 186, the left kidney alone in 30, and both kidneys in 368. These results vary markedly from those given by Mackenzie, and I can only assume that his investigation did not include an examination in the erect position. The point is of practical importance, because good results from operation cannot be expected if both kidneys are loose and only one is replaced.

ETIOLOGY

The causes of abnormal renal mobility may be conveniently divided into predisposing and exciting.

Predisposing causes.—These may be discussed under the headings:—

1. Heredity.
2. Debility.
3. Spinal curvature.

1. *Heredity.*—Abnormal renal mobility is often met with in people of inherited poor physique. They have long thin waists, narrow chests, and a general bodily structure that would involve their rejection by the recruiting sergeant on the grounds of "weediness." These people are congenital physical degenerates, and active treatment of the renal mobility is hardly ever worth while.

It is, however, by no means unusual to find that the kidneys are movable in several members of a family whose general physique presents nothing very characteristic, and I have operated once upon four sisters, once upon three sisters, and many times upon mother and daughter, brother and sister, and two sisters. It appears as though in some families the kidneys are less well supported than usual, and prolapse occurs very easily.

2. *Debility.*—Any cause of malnutrition involving loss of fat and muscular loss of tone is a predisposing cause of nephroptosis. Muscular tone is the main factor in preventing displacement of the kidneys, and the condition of the abdominal muscles is far more important than the amount of fat in the loins. All those conditions which are responsible for the development of adolescent scoliosis predispose to nephroptosis. Debilitating illness of any kind must be regarded as a predisposing cause on account of the loss of muscular tone brought about.

3. *Spinal curvature.*—Associated with this are changes in the shape and dimensions of the renal fossæ with consequent tendency to displacement of the kidneys. The backache from which patients with scoliosis often suffer may in part be caused by the displacement of the kidneys. For example, a girl of 20 suffering from old-standing

scoliosis consulted me on account of severe backache which compelled her to relinquish her work as a music teacher. A spinal jacket gave her practically no relief. Both kidneys, which were loose, were operated upon. Two years later she reported herself as being very much better, and said that she had entirely lost her old pain. She had gained appreciably in weight.

Exciting causes.—The most important exciting causes of movable kidney are :—

1. Trauma.
2. Errors of dress.
3. Too early return to ordinary life after confinement.
4. Constipation.
5. Pathological changes in and around the kidney. These are less common than the other causes enumerated.

I propose briefly to discuss each of these causes separately.

1. *Trauma.*—Experience of a large number of cases of movable kidney has taught me that muscular overstrain is very commonly the exciting cause of the mobility. It is difficult to imagine that the kidney can ever become suddenly freely movable as the result of a strain or of external injury to the back, though rotation of the lower pole with little or no prolapse may be, and often is, suddenly caused in this way. Several times in men, and once in a woman, I have met with rotated kidney the symptoms of which all dated from a severe strain of the back. In the case of the woman, while attempting to lift a heavy piece of furniture she felt a sudden, severe, sickening pain in the right side. The pain persisted, and was greatly aggravated by bending or lifting. There was also increased frequency of micturition during the day, and cutting urethral pain while passing urine. The patient was unusually muscular for a woman. The right kidney could be felt beneath the costal margin in front of the loin ; it was tender, but only slightly movable. At the operation it was found to be

rotated, slightly prolapsed, and bound down by numerous adhesions to the capsule.

A man, aged 50, came to see me complaining of pain in the right loin and right side, of such severity as to prevent him from working. He was a powerful, muscular man, employed as an ironworker, and until a year before I saw him had been perfectly well. He stated that about a year previously he had overstrained himself, and ever since had had pain in the right side. The pain was peculiar in that it was only present in the erect position, disappearing at once on lying down. Any exertion, and particularly stooping, made the pain worse. For six months he struggled on with his work, but then had to discontinue it on account of the severe pain. The pain started high in the right loin, whence it radiated up to the right shoulder and along the right costal margin. It was severe and sickening in quality. The man showed no sign of ill-health except a slight haze of albumin in the urine.

The albumin was present when he was up and about, but disappeared when resting in bed. On the first occasion I definitely felt the right kidney high up in the hypochondrium, but could never do so again. An X-ray examination gave a negative result. Some relief was obtained by wearing a kidney belt, but bending still brought on the pain. After I had had the man under observation for a year, Mr. Jordan Lloyd explored the kidney for me. There was considerable difficulty in finding it, as it lay high up under the diaphragm and was small and shrunken. The pelvis was moderately dilated. This appeared to be an example of destruction of the kidney by almost complete obstruction of the ureter where it crossed the rotated lower pole. The displacement would seem to have been caused by the initial strain, from which all symptoms dated.

The following cases are illustrative of the way in which renal mobility may result from muscular strain :—

i. In February, 1907, I saw a lady, aged 37, who stated

that she had been quite well until the preceding August. Then, while laughing uncontrollably in a theatre, she felt a sharp pain in the right side. The pain continued to be very severe, and she was in bed for several weeks. A diagnosis of gall-stones had been made, and this was strengthened by the presence of an acutely tender lump in the hypochondrium. The pain gradually subsided, and the right kidney was then found to be very movable. When she was seen the right kidney was freely movable and tender. As it still caused her much pain, nephropexy was performed. She has remained perfectly well since.

ii. In March, 1909, a young man, aged 19, was sent to me by Dr. Thomas Nelson. He was an engineer, and his work was very heavy. For several months he had had a pain in the right side, which was made worse by exertion. Latterly he had had to stay away from work every third day in order to rest. He also found that he tired very easily, slept badly, and was losing weight. He was a powerful, well-built man with no evidence of neurasthenia or disease of any kind. In the erect position the right kidney, which was tender, fell 2 inches below the costal margin, and the hand could easily be passed over the top of it. Fixation of the kidney gave complete relief. In this case the severe muscular strain involved by his work was the only satisfactory explanation of the renal mobility.

iii. In October, 1909, I was asked by Dr. Kennedy, of Gosta Green, to see a lady, 70 years of age. Two months previously, after raising up her bedridden husband, she was seized with acute pain in the right side. The pain was accompanied by vomiting and collapse, and morphia had to be injected for its relief. Since then she had had many similar attacks of varying severity. The slightest exertion caused pain, even sitting up in bed, and she was only comfortable when lying down. The right kidney was easily felt on a level with the anterior superior spine. It was not enlarged, but lay horizontally with its convex

border directed downwards. A belt was tried without benefit, when, as the patient's life was made miserable by her inability to do anything without pain, the kidney was fixed by operation. This was followed by immediate and complete relief.

The relationship between trauma and renal displacement is of interest from a medico-legal standpoint. Many claims for compensation have been made in the County Courts on the ground that the kidney was dislocated and became loose as the result of an accident or strain met with while at work. It is very doubtful whether a single strain or blow upon the loin can ever immediately displace the kidney to an appreciable extent. It is, however, quite possible that the kidney may be loosened in its bed by such an injury, or may even become rotated. Unless the initial injury is followed by a sufficient period of rest, gradual increasing displacement may result. Incidentally, a severe strain may affect a kidney which is already loose very harmfully and initiate or aggravate symptoms in connexion with it. The following case illustrates the harm that may follow severe strain when the kidneys are abnormally movable. A lady who was known to suffer from movable kidneys was imprisoned on acccount of her activities as a suffragette. She went on hunger strike and was forcibly fed. As she resisted very actively she was held by two wardresses on a bench, her shoulders being forced backwards while the tube was passed. The back of the bench forced her loins forwards, and in this position her violent struggles severely strained her kidneys. She became so ill that she was shortly afterwards released, and I then found both kidneys acutely tender and swollen. With complete rest in bed the more acute symptoms subsided, but severe backache occurred if she remained standing or sitting for any length of time, and relief was only secured by double nephropexy. In spite of the mobile kidneys she was an active woman suffering only from a mild degree of neuras-

thenia before the strain, while afterwards she was reduced to a condition of semi-invalidism.

In many cases it is not possible to associate the renal mobility with preceding trauma so directly; but from the nature of the patient's habits and occupation, and the absence of any other satisfactory explanation, it seems most probable that the kidney was started on its downward path by a strain or direct injury to the loin.

2. *Errors of dress.*—Corsets have been held responsible for many of the troubles common to women, and amongst other things for movable kidney. Such a general accusation needs analysis. Whether corset pressure tends to displace the kidneys or not entirely depends upon the level of maximum constriction. If this occurs above the centre of the kidney—i.e., when the waist is "high"—the pressure does tend to force the kidney downwards. The lower ribs are pressed in, the upper part of the renal fossa diminished in size, and the kidney extruded. This is especially likely to occur if the corset not only creates a high waist, but fails adequately to support the lower abdomen. The most pernicious type of corset is the "ribbon," which constricts without giving support; and the higher the level of the constriction the more deleterious are the effects upon the kidneys. Corsets, on the other hand, which create a "low waist," and adequately support the lower abdomen, tend to prevent prolapse of the kidneys, although the support they give is, perhaps, more than counterbalanced by the muscular atony they induce.

On the whole, however, errors of dress tend to aggravate rather than cause mobility of the kidneys. A kidney which is already prolapsed is far more liable to be affected by the pressure of corsets and the constriction of skirt-bands than is a kidney in its normal position. Whatever view, therefore, is taken with regard to the effect of constriction of the waist in causing movable kidney, there can be no doubt whatever of its harmful effects when the kidney is already movable.

3. *Pregnancy and the puerperium.*—Pregnancy has been blamed by many authorities for the greater frequency of movable kidney in women. The reasons given are :—

i. Sudden diminution of intra-abdominal tension after parturition.

ii. Violent contractions of the diaphragm during labour.

iii. Post-partum flaccidity of the abdominal walls.

iv. Too early return to ordinary occupations after delivery.

If pregnancy plays any real part in the production of movable kidney, the condition should be more common among married women than single women. Turning to my own records, I find that of 204 women upon whom I have operated, 99 were married and 105 were single. From this it appears that renal mobility is equally common in the two classes. Further, very few of the married women had borne more than one or two children ; in fact, my experience rather indicates that the sufferers from movable kidney are less fertile than usual, and that the mothers of large families to a large extent escape the more serious troubles associated with renal mobility.

I cannot agree that pregnancy and parturition *per se* are important causal factors in movable kidneys. It is, however, certain that for some time after confinement the general condition is such that descent of the kidneys, together with the other abdominal organs and uterus, is more likely than usual to occur. The abdominal muscles are flaccid and toneless, the pelvic floor furnishes a less efficient support, and the woman is frequently weak and debilitated. These conditions predispose to prolapse of the uterus and general visceroptosis rather than to descent of the kidneys alone. A debilitated woman assuming her everyday duties too soon after confinement is very apt to suffer later from pendulous abdomen and uterine prolapse. All the abdominal organs are more or less affected, the kidneys merely sharing in the general descent. If, as is

often the case, an attempt is made to diminish the size of the waist by wearing tight corsets which do not adequately support the lower abdomen, the condition is further aggravated. Such patients suffer severely from a sense of "abdominal drag," but this is due in small degree to the prolapsed kidneys, and nephropexy will give but little relief. The proper treatment for such cases consists in attention to the general health, measures directed to improving the tone of the abdominal muscles, and general support of the prolapsed viscera by a properly-fitted elastic belt.

The following case illustrates this condition of general prolapse after parturition :—

A lady, 26 years of age, was sent to me by Dr. Walter Hues, of Handsworth. She was confined of her first and only child two years previously. Before her confinement and for some time afterwards she had been in good health. She then began to complain of "an empty, sinking feeling" in the lower abdomen, which was induced by exercise and certain foods. This feeling was relieved by lying down, and never came on in the recumbent position. She also suffered severely from constipation, flatulence and water-brash. Latterly she found that she tired very easily, slept badly, woke up in the morning with a heavy, dull feeling in the head, and was losing flesh rapidly. Menstruation occurred every three weeks, and the loss was greater than formerly. There was increased frequency of micturition.

The patient was a thin, excitable, nervous woman. The abdominal muscles were very lax, and in the erect position the lower abdomen became very protuberant. The right kidney was very movable, but not tender ; the left kidney could not be felt. On standing up, the intestines sagged downwards and the stomach slightly prolapsed, while the patient at once complained of a dragging sensation.

On inquiry, she stated that on getting up after her confinement at the end of two weeks she at once resumed

active household work, and, in addition, was in the habit of carrying her baby every day to a park some distance away. She nursed the baby herself for many months.

In this case, in view of the general enteroptosis, an elastic belt was ordered. This has given very great relief.

Women with movable kidney frequently state that during pregnancy they feel much better, most of the troublesome symptoms disappearing. The probable explanation is that the enlarged uterus supports the kidney. After parturition, however, the old troubles reappear in an aggravated form.

4. *Constipation.*—Chronic constipation has been advanced as a cause of movable kidney. The hepatic flexure of the colon is in close relationship with the right kidney, and it is quite feasible that the constant drag of an overloaded cæcum and colon might tend to displace the kidney. It is difficult, however, to say how far this actually occurs. Constipation is much more common than movable kidney, and many women suffer from aggravated constipation for years without acquiring renal mobility. Again, constipation is a very common symptom of movable kidney, coming on *after* the kidney has undergone prolapse. On the whole, it seems more probable that constipation is rather the result than the cause of renal mobility, if there is any direct connexion between the two conditions.

Howard W. Longyear, of Detroit, claims to have discovered a fibrous connexion between the lower pole of the kidney and the colon. To this he has applied the term "nephrocolic ligament." If the peritoneal attachments of the hepatic flexure are looser than normal, the laxity being either congenital or acquired, the cæcum and transverse colon tend to sag downwards. This causes a drag upon the nephrocolic ligament, and through it upon the kidney. Unless the kidney is securely fixed, the direct downward drag of the colon and cæcum will induce nephroptosis. In short, Longyear contends that "coloptosis" is the primary occurrence, and that the prolapsing colon by

its direct drag upon the kidney through the nephrocolic ligament causes secondary nephroptosis.

There is no doubt about the existence of the structure described by Longyear, but it seems to be pathological and not anatomical. The so-called ligament is really a very constant band of adhesions of great density extending from the lower pole of a movable kidney downwards and inwards to be attached to the colon, the peritoneum and the walls of the lower renal fossa. I have frequently sought for it in vain in the case of normally placed kidneys. To settle the matter, however, I submitted the point to Professor Arthur Robinson, Professor of Anatomy in the University of Edinburgh. He stated that no such ligament should exist on embryological grounds, that if it did exist its effect would be harmful, and that he had sought for it in vain in several bodies in process of dissection. This being so, there is no reason for preserving it as Longyear advocates when performing nephropexy. My practice is to free the lower pole of the kidney from this and all other adhesions, as their effect is to drag on the kidney and jeopardise the success of the operation. The "ligament" is attached to the colon too low down for traction on it to be of any real value in correcting coloptosis. As already stated, the cause of the latter when it occurs in association with nephroptosis is the loosening of the attachments of the peritoneum at the hepatic and splenic flexures.

5. *Pathological changes in or near the kidneys.*—Any pathological condition which increases the pressure in the lateral subdiaphragmatic spaces tends to cause displacement of the kidneys. Enlargement of the kidneys as a result of hydronephrosis, tumours, or congenital cystic disease, is almost invariably accompanied by its prolapse. A normal kidney may also be pushed out of position by an enlarged liver or spleen, or by tumours encroaching upon the renal fossa.

CHAPTER IV

PATHOLOGICAL CHANGES IN SURROUNDING STRUCTURES

THE path along which the kidney moves as it descends, and the factors which determine the line of descent and the nature and amount of rotation in the different positions in which it may be found, have already been described. It remains to consider the pathological changes that may occur in the neighbouring structures, and in the kidney itself, as the result of the mobility.

1. **Perinephric fascia.**—As already stated, the perinephric fascia consists of an anterior and a posterior layer, which are attached internally to the vertebral column, and externally are continuous with one another. It thus forms a tubular, fascial investment for the kidney and the fat immediately surrounding it. The posterior layer is separated from the muscles of the back by a variable amount of fat, through which pass some strands of connective tissue. The best marked of these extends from the perirenal fascia to the intermuscular space between the psoas and quadratus lumborum.

In slight degrees of renal mobility movement of the kidney takes place within the perirenal capsule, and the fascial walls of the latter are not dragged upon. In such cases the only observable change in the perirenal capsule is due to atrophy of the contained fat; it feels less tense than usual, and as though it were half empty. When the kidney is more freely movable other changes are noticeable. The posterior layer is thicker and more definite than usual,

and is not so closely applied to the back muscles; on dividing the lumbar aponeurosis from behind, it seems to have fallen away forwards and inwards. Sometimes, in addition, there is definite prolapse.

That the perirenal capsule does move to some extent with the kidney can readily be demonstrated when operating for renal mobility. If a small opening be made in the capsule before the contents of the loin are disturbed and a finger introduced, the kidney can, by light pressure, be pushed into the position it assumes when the patient is erect. It will then be noticed that the perirenal fascia is pulled upon, and the posterior layer is dragged downwards and inwards.

To sum up, in well-marked cases of movable kidney the perirenal capsule is thicker and less closely attached to the back muscles than usual, feels half empty, and in some cases is definitely prolapsed.

2. **Capsula adiposa.**—Under normal conditions this consists of soft, lobulated fat packed around the kidney and filling up the perinephric capsule. It is held together by delicate strands of connective tissue, and its connexions with the enclosing fascia and the kidney capsule are so slight that little resistance is opposed to enucleation of the kidney by the finger.

Atrophy and partial absorption of the capsula adiposa is one of the first effects of abnormal renal mobility. In old-standing cases the fat may have almost disappeared, its place being taken by loose connective tissue. This connective tissue is arranged in sheet-like lamellæ and stronger bands extending from the true kidney capsule to the perinephric fascia. The adhesions thus formed are sufficiently lax to allow the kidney a certain range of movement without the perinephric fascia being dragged upon. Though loose and open they are very tough, and cannot be broken through by the finger. Attempts to do so are apt to tear away the renal capsule, leaving the organ

decapsulated. To free the kidney it is necessary to divide the adhesions with scissors. On account of the range of movement possible within the perirenal capsule it is impossible to secure the kidney by suturing the fascial capsule to the muscles of the back, as has been suggested.

In old-standing cases the perirenal adhesions are pale and bloodless, but in cases of recent displacement they may be vascular and their division attended by free oozing. Occasionally, large veins are seen coursing over the surface of the kidney. A few of these pierce its capsule, and must be divided and ligatured, but the majority can be avoided by keeping the scissors close to the kidney.

Where there have been frequent attacks of partial strangulation of the kidney due to twisting of its vascular pedicle, an accident caused by rotation, adhesions of a much denser kind may be met with. These bear a close resemblance to ordinary scar-tissue. The anterior layer of the perirenal fascia cannot be distinguished as a separate structure, being merged in the adhesions which appear to connect the kidney directly with the peritoneum, the colon, and the transversalis fascia. Adhesions of this kind are far less lax than those ordinarily seen within the perirenal capsule, and may firmly attach the kidney to adjacent structures. I have seen the ascending colon so closely connected with the kidney that it was dragged out on the loin with the latter organ, and could only be separated from it with considerable difficulty. Newman states that he has seen the kidney fixed by its convex border to the lower edge of the liver by similar adhesions which involved the peritoneum.

Occasionally the tissues of the loin, and particularly the capsula adiposa, are found to be œdematous and unusually vascular. This indicates bacilluria with involvement of the kidney pelvis. Chronic bacilluria is very persistent when the kidneys are mobile, but is easily overlooked, and the condition of the loin at the time of operation may first lead to a suspicion of its existence.

These dense adhesions may anchor the kidney, and have been known to cure the condition (Newman). More often they fix it in an abnormal position, when serious symptoms may result. A married woman, aged 34, was sent to me by Dr. Russell Green, of Aldridge, on account of severe pain in the left side. The pain started under the costal margin and radiated upwards to the shoulder-blade and downwards to the groin. Exertion of all kinds aggravated the pain. A month previously she had had a severe attack of renal colic, for which morphia was given. At this time an acutely tender lump was discovered in the left hypochondrium. When the patient was seen the left kidney was found lying very obliquely below the costal margin. It was tender, and only slightly movable. At the operation the kidney was found lying almost horizontally, entirely below the ribs. It was bound down by dense adhesions, which prevented movement and held it firmly in its rotated position. There was no obvious dilatation of the pelvis. All the adhesions were carefully divided and the kidney fixed in its normal position, with immediate and continued relief of all symptoms.

Similar dense adhesions are always met with when a kidney which has been previously fixed is operated upon a second time. Such kidneys are rarely very movable, though the displacement may be marked and the symptoms very acute. It is a fact to which Goelet drew particular attention, that a badly fixed kidney often causes more severe disturbance than one that is freely movable. Any mechanical interference with circulation or the passage of urine along the ureter due to faulty position is constant when the kidney is fixed, but although constantly recurring is only intermittent when the kidney is movable. It is therefore of great importance that the kidney should be replaced as accurately as possible in its normal position to avoid torsion of its pedicle or kinking of the ureter.

3. **Peritoneum.**—The peritoneum is separated from the anterior surface of the kidney by the anterior layer of the perirenal fascia, with which it is closely connected. Where the colon comes in contact with the kidney this arrangement is altered, the peritoneum passing over the colon so as to enclose it, except on its posterior aspect, while the perirenal fascia passes between the kidney and the colon. On the outer side of the colon the peritoneum forms a pouch which extends backwards for a variable distance into the loin.

So long as the movements of the kidney do not cause dragging upon the anterior layer of the perirenal fascia, the peritoneum is not affected. When, however, the perirenal fascia yields, the peritoneum is dragged upon and its attachments may become loosened. Whether this occurs or not depends upon the strength of the connexions between the anterior layer of the perirenal fascia and the peritoneum. If they are strong the peritoneum will follow the fascia ; if weak, the two are separated.

The loosening of the peritoneum affects the structures in the immediate neighbourhood which are related to it. Thus the duodenum is dragged upon and may become kinked to such an extent as to cause obstruction of its lumen, with resulting symptoms of duodenal stasis and gastric dilatation. Several cases have been recorded in which death has resulted from duodenal obstruction due to a displaced right kidney. Several times in the course of an abdominal exploration for symptoms of duodenal or gastric origin associated with an X-ray report of definite stomach stasis, I have found the first and second stages of the duodenum unusually mobile and dilated, and the right kidney movable. When the kidney was drawn down an obstruction of the duodenum near the junction of the second and third stages was caused sufficient to completely close the lumen. On pushing up the kidney into its normal position the obstruction was completely relieved. This

form of duodenal stasis is quite common in association with movable right kidney in men, and is responsible for the severe dyspeptic symptoms from which they may suffer. It differs from the type of stasis so well described by Professor Wilkie, in that the third stage of the duodenum does not appear to be involved, the obstruction occurring at the lower end of the second stage. The indications from within the abdomen are an unusually mobile and dilated duodenum in its first and second stage, and kinking in the lower part of the second stage which is caused by pulling the kidney down and relieved by pushing it up. The pylorus is frequently dilated, and there is then associated dilatation of the stomach. Fixation of the kidney in its normal position is the correct treatment and gives most satisfactory results. When the kidney becomes fixed in an abnormal position it may cause permanent obstruction of the duodenum, with far more serious symptoms, and even cause death. Sometimes duodenal hæmorrhage may apparently be caused by a movable right kidney, of which the following case is an example: A lady was referred to me by Dr. Douglas Stanley with a history of having suffered from several severe attacks of hæmatemesis and melæna at intervals of three or four years. There were no other symptoms of duodenal ulcer, and the attacks had extended over a period of nearly twenty years. Each hæmorrhage was preceded by some unusual exertion on the part of the patient. She had a very movable right kidney, and Dr. Stanley concurred with me in the opinion that the kidney was the exciting cause of the hæmorrhage.

Probably the jaundice which has been noticed as a complication of movable kidney has been caused by the dragging upon the duodenum having interfered with the outflow of bile. That gall-stones are frequently associated with movable kidney has been asserted by some authorities. My experience leads me to an exactly opposite conclusion. For in upwards of fifteen hundred patients upon whom I

have operated for movable kidney, gall-stones were found in only a few instances, although a careful examination of the gall-bladder is always made, a hand being introduced into the peritoneum through an opening made into it from the loin.

The descending kidney may pass behind the colon and appear on the inside; it may push the colon inwards and remain external to it; or, finally, it may force its way between the two layers of peritoneum which form an imperfect mesocolon. The relationship of the kidney to the peritoneum will correspondingly vary. In the first case, where the kidney appears on the inside of the colon, it pushes the peritoneum in front of it and may acquire a mesentery 2 or 3 inches long. Probably the mesentery described in connexion with floating kidney is nearly always acquired in this way—a true congenital renal mesentery, if it ever occurs, being exceedingly rare. A kidney taking this course has been known to press upon the inferior vena cava to such an extent as to cause obstruction and thrombosis of the vein below. In the second case, where the kidney descends upon the outer side of the colon, the peritoneum is dragged upon to a much less extent. As the kidney comes forwards and inwards, however, it tends to press upon the colon. In its early stages a movable kidney may insinuate its way between the layers of the mesocolon. This loosens the attachments of the colon to a marked extent. As close adhesions form at the same time between the colon and kidney, the former will participate in the movements of the latter, and severe colon troubles result.

When the abdomen of a patient with old-standing movable kidney is opened, it is common to find intraperitoneal evidence of the irritation caused by the kidney. Numerous delicate, sheet-like adhesions may be seen enveloping the organs adjacent to the renal fossa. These adhesions are very similar in appearance to those surrounding the kidney itself. They most often occur around the hepatic flexure

of the colon, but may involve the gall-bladder, the cæcum and the appendix. On one occasion, where the abdomen had been opened for the purpose of removing the appendix, the gall-bladder, pylorus, colon, cæcum and appendix were surrounded by delicate adhesions arranged in lamellæ and flattened bands. The adhesions were pale, lax and translucent, but very tough. The appendix was quite healthy, and no satisfactory cause for the adhesions could be discovered within the peritoneum. The right kidney was very movable and surrounded by adhesions similar to those within the peritoneum. Arbuthnot Lane has commented upon the frequency with which adhesions of the type referred to are met with in the neighbourhood of the hepatic flexure. These, I believe, are frequently caused by a movable right kidney, and not primarily by the drag of an overloaded cæcum.

The changes that may occur in the arrangement of the peritoneum in the loin are of importance in connexion with nephropexy. The pouch on the outer side of the colon may be deeper than usual and extend much farther back in the loin. Unless care is taken it may be accidentally opened when exposing the kidney.

4. **Colon.**—Many of the effects of movable kidney upon the ascending colon and hepatic flexure have already been referred to. The main disturbances are caused by loosening of its peritoneal supports and consequent prolapse. The transverse colon may also sag downwards owing to loosening of the attachments of the flexures. As a result of this, angulations may form, which, if made permanent by the formation of adhesions, interfere with the passage of fæces and induce constipation. Moreover, adhesions between the kidney and colon are almost constant, and these further interfere with its functions.

That the colon is handicapped by pathological mobility of the neighbouring kidney is evident from the constancy with which symptoms referable to the colon occur in persons

with movable kidney. Obstinate constipation, intestinal flatulence, and vague colon pains are common; while on two occasions I have fixed the kidney for mucous colitis with complete success. In one case of mucous colitis the colon was so firmly bound down to the kidney by dense adhesions that separation was effected with the greatest difficulty.

The descending colon, being less closely related to the kidney than the ascending colon, is less markedly affected by its mobility. The range of movement also is generally less than it is on the right side.

5. **The suprarenal capsules.**—These structures rarely drop with the kidneys. The suprarenal capsule is enclosed in a separate fascial compartment, and this fact, together with its firm connexions generally, accounts for the rarity of prolapse. In about 5 per cent. of cases of movable kidney the suprarenal capsule is, however, found adherent to the kidney and moves with it. It is then more difficult to bring the kidney out of the wound, as the attachments of the suprarenal are less lax than the renal pedicle, and while allowing of considerable prolapse do not permit the upper pole of the kidney to reach the skin of the loin. In some instances the suprarenal capsule appears to have undergone fibro-caseous degeneration and to have contracted firm adhesions to the kidney. The adhesion of the suprarenal to the kidney should be respected when performing nephropexy, as satisfactory replacement can be secured, although the manipulations are rather more difficult than usual.

6. **Other organs.**—Not infrequently some prolapse of the spleen is associated with mobility of the left kidney, and the two organs may be palpable. This is not surprising when it is remembered how closely the two are connected by the lieno-renal ligament.

The right kidney may fall into the pelvis and cause direct pressure upon the bladder, ovary and uterus. On one occasion I anchored the right kidney for persistent menor-

rhagia. The kidney was extremely loose and could be pushed into the pelvis. Operation was followed by complete cure. I have also seen the right kidney removed by a gynæcological surgeon; it lay within the true pelvis, and could be felt as a tender lump from the vagina. Less directly, movable kidney may cause symptoms referred to the pelvic organs by inducing congestion and irritating the nerves of the ovarian plexus.

CHAPTER V

PATHOLOGICAL CHANGES IN THE KIDNEY

A MOVABLE kidney, examined during life, presents some very characteristic features. In old-standing cases it is paler than normal, and feels soft and flabby. Instead of being firmly padded round with soft, lobulated fat, it is loosely held by numerous lamellated adhesions. The renal pedicle is elongated, and allows of its ready delivery on to the loin through a small posterior incision. In recent cases, and where venous engorgement has been caused by twisting of the pedicle, the kidney may be somewhat enlarged and dark purple in colour.

The effect of the mobility upon the various parts of the kidney will be separately considered.

1. **The capsule.**—As a rule, the capsule is thicker and more opaque than that of the healthy kidney. It is studded over with yellowish-white, irregular patches which give it a mottled appearance. These patches correspond to the attachments of the denser perirenal adhesions, and are thicker than the intervening portions of the capsule. In some cases veins of moderate size pierce the capsule. When divided these bleed on the kidney side. They appear to be collateral veins developing as a result of constantly recurring venous congestion of the kidney due to partial torsion of the renal pedicle and obstructed venous return. Occasionally, tense cysts of varying size are seen on the surface of the kidney beneath the capsule. The exact significance of these cysts is doubtful. When they are pricked a clear,

glairy, yellowish fluid escapes and a deep depression in the cortex remains. In recent cases, and in stout persons, the capsule may be very thin and tear easily when attempts are made to detach it from the cortex.

Usually the capsule of a movable kidney can be readily detached from the cortex, leaving a smooth, red surface exposed. Adhesions are not common, even beneath the thicker patches to which the perirenal adhesions are attached. In old-standing cases, however, the capsule may be very adherent, and can then only be detached with difficulty and with some tearing of the cortex.

2. **The ureter and pelvis.**—In the upper part of its course the ureter lies within the perirenal capsule, supported only by the loose fat of the capsula adiposa. A little below the lower pole of the kidney it becomes applied to the anterior layer of the perinephric fascia, by which, and the overlying peritoneum, it is firmly held. Moderate prolapse of the kidney may occur, as a result of this arrangement, without kinking of the ureter. When, however, the hilum of the kidney descends below the point at which the ureter becomes attached to the perinephric fascia, kinking of the latter results. So long as the kidney is freely movable, the kink is of only temporary duration, and serious obstruction does not occur. In the recumbent position the kidney returns to its normal situation, and the ureter is straightened out. Further, every movement of the body tends to change the position of a freely movable kidney, and such changes in its position must make the obstruction intermittent and transient. Should the kidney become accidentally fixed in a position in which the ureter is kinked the state of affairs is far more serious. The kink, instead of being temporary, is made permanent, and the resulting back-pressure of urine, from being transient becomes continuous. Clinical experience affords ample evidence that displacements of the kidney cause more severe symptoms in people who are compelled to maintain the upright

position for many hours together than in persons who can rest at frequent intervals. Shop assistants and schoolmistresses are more affected by an equal degree of renal mobility than are housewives. Experience also has taught me that more profound trouble is often caused by displaced, slightly movable kidneys than with freely movable ones, the amount of displacement being equal.

Gross dilatation of the extrarenal portion of the pelvis is comparatively rare in uncomplicated renal mobility. When it does occur definite obstruction of the ureter by an aberrant renal artery or the lower pole of the rotated kidney can usually be demonstrated. Mobility alone cannot, therefore, be a common cause of hydronephrosis. It must not, however, be assumed from this statement that mobile kidneys display no evidence of urinary back-pressure; many of them do. Careful examination of the hilum with the finger often reveals the fact that the intrarenal portion of the pelvis is dilated, and that the pyramids are flattened. In cases where the pelvis has been opened and a finger introduced, this observation has been verified. The flabby, soft feel of many mobile kidneys is also suggestive of back-pressure. Such evidence as is obtainable tends to show that definite back-pressure does occur in many cases of movable kidney, but that it is insufficient to produce obvious hydronephrosis. Clinically, the symptoms due to ureteric obstruction and twisting of the renal vessels are very similar, and it is by no means easy to say, from such examination of the kidney as is possible during operation, how far urinary back-pressure, or circulatory disturbance, is responsible for observed pathological changes. Acute renal pain, such as characterizes Dietl's crises, is probably always caused by twisting of the vascular pedicle.

Pyelography has enabled a more exact investigation to be made of the effect of mobility in causing back-pressure of urine. Pyelograms made while the patient is lying down may not show very obvious changes in the renal pelvis,

but careful study of them often reveals a moderate degree of dilatation of the pelvis with slight flattening of the pyramids. The cause of this at once becomes apparent when the patient is photographed in the erect position. The kidney then falls, and gross kinks and twists of the ureter appear. That so little significance has been attached to what is often a serious interference with urinary excretion in movable kidney is probably due to the difficulty experienced in obtaining satisfactory pyelograms when the patient is erect. As this difficulty is overcome, valuable evidence upon which to base an opinion as to the necessity for nephropexy in individual cases of renal mobility will become available.

A woman, aged 50, complained of severe pain in the right loin of three years' duration. She described the pain as burning and dragging, and stated that when she had been erect for an hour or two it became so severe that she felt giddy and nauseated and was compelled to lie down. There was scalding pain on micturition, and the act was accompanied by bearing-down pains round the umbilicus. Although never entirely free from pain it had a tendency to come on in severe attacks several times a week. She complained of lack of energy, loss of appetite and general malaise. She had lost weight. On examination, the right kidney was found to be very movable and tender: on standing up the kidney fell into the iliac fossa.

My colleague, Mr. Bernard Ward, very kindly made pyelograms for me, photographs being taken with the patient horizontal and erect. These illustrate very strikingly the angulation and kinking of the ureter and interference with the free escape of urine that occurred on the assumption of the vertical position, and the complete restoration to normal when lying down. Had an opinion of the effect of the mobility upon renal function been based upon the pyelogram made while the patient was horizontal it would have been entirely misleading. Beyond a moderate dilatation of the

renal pelvis and enlargement of the calyces there is little to indicate severe back-pressure.

Very few cases have been recorded of hydronephrosis developing in a kidney which was previously known to be movable. I have only met with one example: A woman, 50 years of age, who suffered from neurasthenia and dragging pain in the side and abdomen, was found upon examination to have a freely movable right kidney. The kidney was not enlarged, and there was nothing to suggest that it was hydronephrotic. Eighteen months later she was seen again, and it was then found that the right kidney formed a large swelling, filling up nearly the whole of the right side of the abdomen. The kidney was removed. The pelvis contained 20 oz. of urine at the time of removal. There was no abnormal renal artery over which the ureter was kinked, nor did an examination of the specimen reveal any congenital abnormality of the ureter that might have accounted for the hydronephrosis.

I have twice heard of the kidney having been removed for hydronephrosis two or three years after it had been fixed. The explanation would seem to be that the kidney was fixed in such a position that the ureter became permanently kinked. If the kidney is fixed at too low a level, this accident is especially liable to occur.

A well-recognized cause of hydronephrosis is kinking of the ureter over an abnormally placed renal artery. It is not at all unusual to find one or more arteries, sometimes of large size, entering the kidney above or below the hilum. In many instances these vessels arise directly from the aorta and take a direct course to the kidney, which they may enter near the poles. Such an aberrant artery, passing in front of the ureter to the lower pole of the kidney, may readily cause hydronephrosis should the kidney become mobile. The ureter, as the kidney falls forwards and downwards, becomes sharply kinked over the vessel. Not only is the ureter kinked at the point where it crosses the

aberrant artery, but it has been observed (Wilson and Howell) that a stricture may form at this point, and so narrow the lumen that it will scarcely admit a probe. I have many times seen hydronephrosis associated with

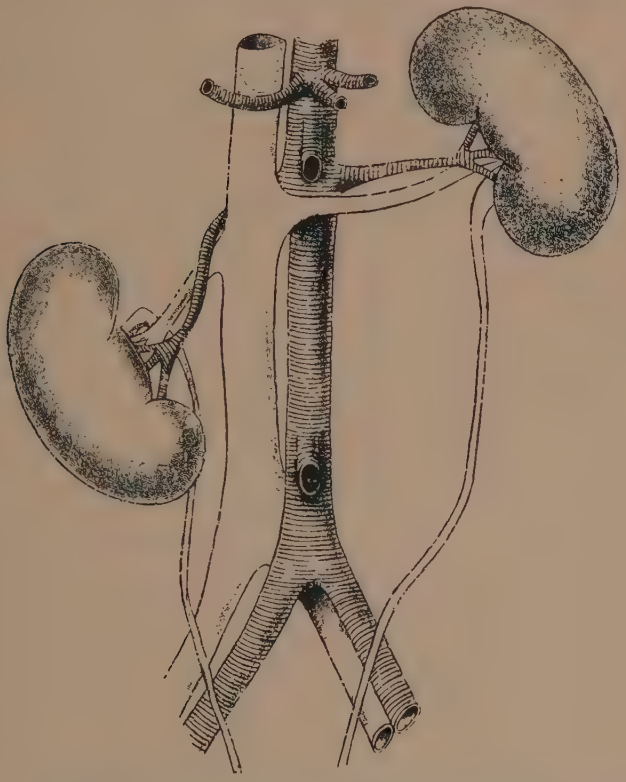

Fig. 3.—Diagram to show effect upon the ureter of prolapse and internal rotation of the kidney. (*Landau.*)

kinking of the ureter over an aberrant artery. The diagnosis before operation may not be made; but when there is a history of intermittent attacks of pain in the loin, and a palpable tender kidney is found, the condition should be suspected, especially when an X-ray investigation for stone is negative. It is important to recognize the condition

early, as it may then be possible to save the kidney. Where the pelvis is only moderately dilated and capable of holding less than about 2 oz., division of the artery and replacement of the kidney in its normal position usually effects a cure. When, however, greater dilatation of the pelvis has developed, and particularly when a pouch has formed below the opening of the ureter, the operation frequently fails to arrest the development of hydronephrosis, and nephrectomy may later become necessary.

In an earlier chapter attention was drawn to the fact that as the kidney descends a rotation about its transverse axis occurs, and the lower pole swings inwards. The ureter may thus be stretched over the lower pole and its lumen practically occluded (Fig. 3). This condition is more common in men than in women, transverse rotation and forward displacement of the kidney occurring at a higher level owing to the greater narrowness of the lower part of the renal fossa.

When discussing hydronephrosis in relationship with renal mobility, it must not be forgotten that, while mobility of the kidney may cause hydronephrosis, the converse is also true. Hydronephrosis may not only result from, but be the cause of, the renal mobility. Any increase in size of the contents of the renal fossa tends to cause their displacement. An enlarging kidney must extend downwards, and in doing so stretches its supports and tends to become movable. Hence all renal tumours are found at a lower level than the normal kidney, and many of them are movable. It must not, therefore, be assumed that, because a hydronephrotic kidney is movable, the disease is necessarily the result of previous mobility.

3. **The renal vessels.**—The renal artery and vein take an almost horizontal course from the hilum of the kidney to the aorta and vena cava respectively. They oppose considerable resistance to descent of the kidney, but gradually stretch under constant strain, and may become

greatly elongated. In one instance I found the right kidney in the cavity of the true pelvis, a position only possible with a renal pedicle upwards of six inches in length.

It is well known that serious interference with the renal circulation may result from abnormal mobility, and be responsible for severe symptoms. Venous return is more likely to be obstructed than arterial supply interfered with. It is by no means unusual to find a movable kidney, at times, enlarged and tender, while at other times it is small and can be pressed without pain. That the former condition is due to congestion is proved by the fact that on several occasions I have found, during operation, such a kidney dark purple in colour and the capsule greatly distended. In some cases, also, petechial hæmorrhages are seen beneath the capsule. When operating upon loose kidneys it can readily be demonstrated how easily venous congestion may be induced. If there is any tension on the pedicle while the kidney is out on the loin, it quickly becomes dark purple in colour and feels hard and tense, while free oozing follows detachment of the capsule. On returning it into the wound, the congestion rapidly subsides and all bleeding ceases. Such attacks of more or less transient congestion must frequently occur in a freely movable kidney, and these attacks are undoubtedly the cause of some of the aching pain from which these patients often suffer.

Occasionally, more severe symptoms of obstructed circulation arise. These are due to torsion of the renal pedicle, a condition to which the term "renal strangulation" has been aptly applied. The symptoms are generally set up by some form of active exercise. The pain is very intense, and may be associated with vomiting and collapse, a symptom-complex to which the term "Dietl's crisis" has been applied. The loin is often so acutely tender and rigid that attempts to examine the kidney are futile. Not infrequently the attack is followed by hæmaturia.

The effects of torsion of the pedicle upon urinary secretion

are interesting. During the acute attack, little or no urine is secreted. As the symptoms subside, a large quantity of dilute urine is passed, which may contain blood, and almost always contains albumin. There appears to be sympathetic inhibition of secretion in the opposite kidney, possibly due to reflex arterial spasm. Such symptoms may occur without any obstruction of the ureter, as the following case exemplifies :—

I was asked by Dr. Starkie, of Moseley, to see a married lady, aged thirty-six. Four years previously the right kidney had been fixed by another surgeon for pelvic disturbances. About six months after the operation she began to feel in the right side a dull ache, which later became constant. At intervals of a few months she had a typical Dietl's crisis, necessitating morphia for its relief. During these attacks the urine was very scanty, and the right side was acutely tender. Each attack was followed by a free flow of pale urine, and after the last one there had been hæmaturia.

On examination the kidney was easily felt near the outer edge of the right rectus at the level of the umbilicus. It was tender, but not enlarged. The hilum looked upwards and to the left, the convex border being directed almost straight downwards. The kidney was fixed in its abnormal position and could not be pushed back into the loin. At the operation the lower pole was found to be anchored by dense bands of adhesions, which kept the kidney in its rotated position. The kidney was congested, but otherwise appeared healthy. The ureter and pelvis showed no evidence of back-pressure, though a careful examination of them was made. In this case, as in several others with a similar history, I have been struck by the presence of many abnormal veins in the perirenal tissue, some of which emerge from the cortex. These emissary veins bleed freely when cut, but the bleeding ceases after the kidney has been restored to its normal position.

4. **The renal nerves.**—The kidney is supplied with branches from the solar plexus which accompany the renal artery as the renal plexus. This close relationship with the great sympathetic plexuses in the upper part of the abdomen would naturally lead one to suppose that interference with the kidney would be attended with considerable shock. Operations upon the normally placed kidney—e.g. for stone—amply justify this supposition. Any disturbance of or dragging upon the kidney or its pedicle is attended by marked symptoms of shock. One of the most remarkable phenomena in connexion with movable kidney is the almost entire absence of shock during and following nephropexy. A movable kidney may be pulled out upon the loin, freed from all surrounding adhesions, and placed in a new position, without any noticeable effect upon pulse or respiration. The shock caused by double nephropexy is often less than that of radical cure of a hernia. As a general rule, the more freely movable the kidney the less the shock. It seems as though the constant stretching and irritation to which the nerves of the renal plexus have been exposed renders them more tolerant of manipulation. While this probably explains the comparative absence of response to stimulation over a short period, it cannot be assumed that the constantly repeated irritation of the renal branches of the solar plexus has no marked effect. The widespread nerve symptoms that are so often associated with renal mobility are possibly due to the cumulative effect of such repeated stimulation. Both in physics and in physiology the profound effects produced by repercussion are well recognized. A series of small wavelets impinging at short regular intervals upon the side of a large ship may cause it to oscillate dangerously ; and the Chinese torture of allowing drops of water to fall at regular intervals on a man's head has the effect of driving him insane.

5. **The renal parenchyma.**—Simple mobility appears to cause but little change in the kidney tissue, such abnormal

conditions as have been observed resulting from accidental obstruction of the ureter, or interference with the circulation. The experimental work of Rose Bradford, De Souza, A. P. Beddard, Bainbridge, Wilson and Howell, and others, upon the effect of ureteric obstruction, venous congestion, and blockage of the renal artery, is referred to in a later chapter. Suffice it to say here that such accidents produce serious structural changes in the kidney and greatly impair its function.

Movable kidneys of long standing are usually paler and softer than normal. Their peculiar flabbiness is independent of pelvic dilatation, though the intrarenal portion of the pelvis is often dilated. The capsule is usually irregularly thickened. In recent cases the capsule almost invariably strips easily, and the underlying cortex is smooth and healthy-looking. In older cases the capsule is frequently adherent in places, and it may be impossible to detach it without tearing the cortex.

Microscopically, it is unusual to find any gross changes in the cortex. Vacuolation and fatty degeneration of the renal cells have been described. There is rarely much excess of interstitial tissue, except in the immediate neighbourhood of the vessels. In my experience it is quite exceptional to come across the small, granular kidney with which one is so familiar in the post-mortem room.

The most characteristic feature of kidneys that have been movable for many years is their smallness. Though retaining the normal macroscopic and microscopic appearances, there is diminution in the total quantity of renal tissue. In other words, movable kidneys, without presenting evidences of serious disease, seem slowly to atrophy. Experimentally, a similar atrophy has been produced by artificial blockage of the ureter for some days, followed by free drainage.

Experiment has demonstrated that the kidney has great power of recuperation from the effects of obstruction of the ureter and interference with renal circulation. Much

secreting tissue is destroyed, but the remainder retains its functions. The appearance in the body of kidneys which have been mobile for a long time suggests the same conclusion, viz. that repeated temporary attacks of ureteric obstruction and twisting of the pedicle produce changes in the kidney from which it subsequently recovers, but with permanent loss of substance.

Two practical conclusions can be drawn from these observations. First, that it is desirable to retain a hydronephrotic kidney if any appreciable amount of cortex remains, and if the cause of the obstruction can be removed, because recovery is probable with a small but functionally efficient kidney. In the second place, that it is inadvisable to regard abnormal renal mobility as a matter of no consequence, since the accidents to which a movable kidney is exposed, though rarely provocative of gross disease, yet tend greatly to impair its function and bring about its gradual atrophy.

No very reliable information is forthcoming as to whether pathologically movable kidneys are more liable than normally placed ones to other diseases, such as calculus, tumours, and tuberculosis. Such evidence as there is goes to prove that such diseases do more often affect movable kidneys, and, prima facie, one would imagine that they do. The difficulty of proof is due to the fact that cause and effect cannot easily be distinguished. Any increase in size of the kidney tends to bring about its displacement. Hence a movable pathological kidney may be movable because it has become enlarged by disease, or it may have been more liable to become diseased because it was movable. I have accidentally discovered a stone in very few instances in upwards of two thousand operations for movable kidney, and I have never seen any evidence of unsuspected tubercle.

6. **The urine.**—It is frequently asserted that renal mobility rarely causes any pathological changes in the urine. This statement is, however, quite unjustified, careful examination proving that it is the exception rather

than the rule for the urine to be continuously healthy. It is perfectly true that at times the urine may appear quite normal; but if several examinations are made while the patient is leading an active life, evidences of alteration in renal activity are generally forthcoming. Goelet states that of the women with movable kidney whose urine was subjected to careful examination, there was evidence of inflammation of the pelvis or tubules in 75 per cent. The characteristic feature of the abnormal constituents is their variability: at one time the urine may contain blood or albumin in large quantity, and at another time be quite healthy. Not only is this so, but the quantity and degree of concentration of the urine often vary considerably. Sometimes a small quantity of highly concentrated urine is passed; at others a large amount of very dilute urine is secreted. The fact that on a single occasion the urine may be healthy is no proof that renal function is undisturbed.

Albuminuria is very common, and albumin may be found in the urine of persons with loose kidneys who appear to be in good general health. The amount varies greatly, not only in different cases, but also in the same person at different times. With rest in bed, or efficient support of the kidney, the albumin may disappear; while unusual exertion increases the amount. Obstructed venous return, with consequent congestion of the kidney, nearly always gives rise to albuminuria. Acute attacks of renal pain may be due to ureteric obstruction or acute congestion from torsion of the pedicle. In both conditions only a small quantity of highly concentrated urine is secreted during the attack, while for some hours afterwards there is a free flow of dilute urine. If the ureter is obstructed, the urine, both during and after the attack, is often free from albumin; while if congestion was the cause, the urine throughout contains albumin, often in large amount.

Hæmaturia is not uncommonly associated with the crises of movable kidney. Noble records 6 cases of severe hæma-

turia for which renal mobility was alone responsible; Newman refers to a number of cases in which it was a symptom; and on several occasions I have met with it. The blood appears to escape into the renal tubules during attacks of acute congestion, and perfect bloodcasts may be found in the urine. Hæmaturia accompanied by pain may suggest renal calculus.

Bacilluria and pyuria.—Pus cells in small quantities are frequently present in the urine of patients whose kidneys are freely movable. These have no particular significance, merely indicating irritation of the kidney pelvis. Occasionally pus is met with in larger amounts and indicates chronic pyelitis and persisting infection of the urinary tract. Most authorities are agreed that infection is more likely to occur when the kidney is movable than when normally placed. It has been proved that the kidneys play an important part in eliminating bacteria from the blood-stream. Bacteria of various kinds have from time to time been discovered in otherwise healthy urine. Of these, the colon bacillus and its allies are most often present, but tubercle bacilli and pyogenic cocci may be excreted with the urine without any evidence of infection of any part of the urinary tract. Should the kidney be damaged by a calculus or by abnormal mobility, it is much more liable to become infected by organisms coming to it in the blood-stream. The greater liability of abnormal kidneys to hæmic infection is emphasized by Farrar Cobb in a paper on "Acute Hæmatogenous Infection of One Kidney in Persons apparently Well" (*Ann. of Surgery*, November, 1908). He states that organisms frequently gain access to the blood-stream through abrasions of the mucous membrane of the lower bowel. Many of these are eliminated by the kidneys, and it is doubtful whether they can cause harm to a normal kidney. If, however, the kidney contains a calculus, or the ureter is in any way obstructed, infection is liable to occur.

With Dr. Mackey's collaboration I investigated bacterio-

logically catheter specimens of the urine of a series of patients suffering from renal mobility. The results showed that a large percentage of cases suffering from nephroptosis in association with marked neurasthenic symptoms and indications of chronic toxæmia, have infected urine. The organism most commonly present is a member of the bacillus coli group, sometimes in pure culture and sometimes associated with other germs. The explanation appears to be that accidental infection of the urinary tract, probably a common event in women, fails to clear up on account of defective drainage of the renal pelvis from kinking of the ureters. Chronic bacilluria with resulting toxic absorption appears to be responsible for some of the remote symptoms so frequently associated with movable kidney. So long as the abnormal mobility exists the infection persists in spite of treatment by urinary antiseptics and vaccines. Nephropexy with the resulting removal of the obstruction to the free passage of urine along the ureters is generally followed by the disappearance of the bacilli, but in some cases subsequent treatment by an autogenous vaccine is necessary. Bacilluria may exist in the absence of definite urinary symptoms, and can be detected only by bacteriological examination of the urine obtained by catheterization. Bacilluria constitutes a strong indication for the active treatment of associated nephroptosis, for its persistence not only perpetuates the ill-health of the patient, but has a harmful effect upon the kidneys themselves.

The following case is an example of severe pyelitis occurring in a loose kidney. In April, 1907, I was asked by Dr. Suckling to see a woman, over forty years of age. She had been ill for some time with headaches and exhaustion. There was constant desire to pass urine, and pain on doing so. She also complained of pain down the outer side of the right thigh and right side of the abdomen. The woman was cachetic, and suffered from frequent rigors. The urine, which was acid, contained a considerable quantity of pus,

Both kidneys were very movable. The bladder was examined under an anæsthetic by Kelly's method, and pus was seen exuding from the right ureter. The urine from the left side was quite clear. The right kidney was explored and found to be very loose, surrounded by dense adhesions, but apparently healthy. No stone existed ; nor was there any undue dilatation of the pelvis. Nephropexy was performed. The patient rapidly improved, the pus disappeared from the urine, and in two months she was apparently quite well.

The effects of torsion of the pedicle and obstruction of the ureter upon urinary secretion have already been referred to. Temporary partial suppression is followed by polyuria. Dr. Stuart Tidey recorded an interesting case in a letter to the *Lancet* (November 23, 1907). The patient was a married woman, aged thirty-seven. She suffered from periodic headache of such severity that it was feared she might attempt suicide. Both kidneys were movable, the right more so than the left. Professor Roux administered a methylene-blue pill, and examined the urine from each side separately by means of Luy's separator. The urine from each kidney was about equal in amount, but that coming from the left ureter was considerably paler than that from the right. This observation led to fixation of the left kidney, with the result that the headaches entirely disappeared and the patient has become a happy, healthy woman.

This case is interesting from two points of view. In the first place, it shows that it is not necessarily the more movable kidneys which give rise to the more serious symptoms ; and secondly, it shows that changes in renal secretion, other than mere variations in quantity, may result from renal mobility, and that this may be the direct cause of severe remote symptoms. Exactly what it is that the kidney fails to excrete, or that, having been excreted, is reabsorbed, is unknown. The need for careful investigation upon this point is very great.

CHAPTER VI

GENERAL PATHOLOGY OF MOVABLE KIDNEY

A MECHANICAL explanation for many of the symptoms associated with movable kidney is satisfactory and generally accepted. The traction or pressure on blood-vessels, nerves, ureter, duodenum, colon, etc., causing dragging pain in the loins and back, severe attacks of pain in the loin due to partial strangulation of the kidney or obstruction of the ureter, gastric and intestinal symptoms, and pelvic disturbances have been fully described in the preceding chapters.

John J. Bell, in a paper on "Nephroptosis; its Causes, Symptoms and radical Cure" (*Brit. Med. Journ.*, May 26, 1923), supports the theory that the widespread functional disturbances associated with movable kidney are caused by stimulation of the sympathetic nervous system. The sympathetic activates the body for struggle; it stimulates the heart to beat more quickly to supply more blood to the muscles, while contracting the blood-vessels in the visceral area and inhibiting the functions of the digestive organs. Bell says: "Should the sympathetic be stimulated to over-action in any of its branches we should naturally expect disturbance of the ordered function of the gland or organ it governs. If this stimulation be more or less continuous there will be engendered in those nerve tracts a special susceptibility to such stimulation and consequently an increased liability to overaction. If we remember the distribution of the sympathetic chain with its numerous

ganglia or exchanges acting as distributing centres, we can comprehend that stimulation received at one point may be passed along from the first receiving station to some other exchange centre, and produce disturbance of the function of another gland or organ remote from the point of stimulation. This action may be seen in reflex vomiting of early gestation, in unilateral renal calculus producing a pain in the other kidney, or in spasm of the pylorus in appendix disease. Sir James Mackenzie's investigations show that the majority of symptoms of disease are disturbances of normal reflexes, and give support to my view that abnormal stimulation of the renal nerves is transmitted to the proximal ganglia, and, passing through the synapses therein, sends out radiation impulses which affect other structures and organs. I believe that in this way a movable kidney, by tugging upon its pedicle, sets up irritation in the nerve, which is transmitted to the proximal ganglion, and that through the synapses therein the irritation is passed either upwards or downwards or both, through other ganglia, thus calling into action, or overaction, the nerve supply to the stomach, bladder, heart, or any structure controlled by the autonomic nerves, producing in one case dilatation, in another irritation, and in a third palpitation. It is this mechanism of transmission and radiation of stimuli which makes possible the comprehension of the numerous and varied symptoms arising from dropped kidney. It has been shown, moreover, that stimulation can be carried to the extent of causing pathological changes in nerve tissue." Langdon Brown says: "The sympathetic response may be so dissociated, perverted, or prolonged as to produce, through the thyroid, Graves's disease, through the pituitary, diabetes insipidus, and through the pancreas and other endocrine organs, excessive mobilization of sugar, which is the first stage of diabetes. It may disorganize digestion by exciting spasm, by producing atony in stomach and bowel, and inhibiting the secretion of gastric juices, etc."

We need only continue the irritation for sufficient time and there must ultimately follow a complete breakdown in the normal responses. As Jelliffe puts it, " after years of maladjustment permanent changes result, and a vicious circle is established in which cause and effect are inextricably interwoven in their general result." Timme, by a series of experiments on the nerves of the stomach, has demonstrated the possibility of unbalanced action in them, and has also shown that such unbalanced actions are constantly brought into operation by mechanical factors, toxins, hormones and by mental stimuli.

The autonomic nervous system comprises the sympathetic and the parasympathetic. Speaking generally of their functions, it may be said that when distributed to the same structure the sympathetic and parasympathetic nerves are antagonistic. The parasympathetic serves for bodily conservation, while the sympathetic excites to wasteful activity.

We thus realize the importance of the perfect balance of these two divisions of the autonomic nerves to the health of the individual. We are cognizant of many factors which disturb their normal harmony, and, though not yet generally recognized, I believe movable kidney is one of the most important of these factors, even in the early stages of descent. Chronic recurrent overstimulation of the nervous mechanism, whether from constant tugging as in movable kidney, or chemical as in retained products of excretion, produces permanent changes in the nerves and ganglia.

These factors have an important bearing upon treatment, for it will be obvious that the sooner disturbing causes are corrected the better for the patient, and, conversely, that in long-standing cases changes may have taken place which cannot be cured, either by palliative or operative treatment.

Toxæmia.—The prima facie grounds for supposing that movable kidney may give rise to toxæmia are (1) the frequent association of renal mobility with symptoms which are difficult to explain on any other basis ; and (2) the close

analogy between these symptoms and those characteristic of diseases known to be toxæmic.

Persistent headaches, progressive asthenia, loss of weight, mental depression, and skin changes—e.g. pigmentation, rashes, and dryness—are difficult to explain on mechanical grounds. Yet no satisfactory explanation of their occurrence, other than that of mobility of the kidneys, can, in many instances, be discovered. That these symptoms are caused by the movable kidneys seems probable, because after persisting for many years in spite of all treatment, they have entirely disappeared after nephropexy. This inference is based, not upon the experience of any single observer, but upon the testimony of many, as the following citations show :

" Nothing is so variable as the nervous troubles which may accompany mobile kidney."—Albarran.

" According to Suckling's statement and my own opinion, after carefully investigated proof of the connexion between insanity and nephroptosis, there is a further addition to therapeutic resources—namely, nephropexy."—Aufrecht.

" For my own part, in association with movable kidney I have observed cases of nervous troubles and modifications of cerebral weakness, such that one could say they bordered on insanity."—Lucas-Championnière.

" There is a great tendency for sufferers from nephroptosis to present neuro-psychical symptoms of different kinds, from simple irritability to typical hysterical fits, and from slight depression to severe melancholia. Hot flushes, insomnia, tremors, nervous coughing, and different forms of paræsthesia are all described in such cases." Of 38 cases subjected to nephropexy, " every patient was cured of renal, vesical, hepatic, and localized intestinal symptoms. Other symptoms were almost always cured or relieved."—Fiori.

" Patients are often restless, excitable, of difficult temper, and eccentric."—Guiard.

"I have seen several cases where insanity has resulted." —Newman.

"In women hysterical symptoms may be marked, and in men various grades of hypochondriasis."—Osler.

"A dislocated or floating kidney is often attended by severe neurasthenia, which disappears when the condition has been remedied by proper measures."—Savile. Speaking of a lady whose symptoms entirely disappeared after a movable right kidney had been supported by a belt, this author says: "She was extremely depressed and melancholic, and her friends feared that her mind would go."

"I believe that a considerable proportion of chronic invalids who, classed indiscriminately as neurasthenics, wander from pillar to post in search of health, are sufferers from symptoms of which movable kidney is the cause. These cases I regard as sufferers from auto-intoxication." —Stuart Tidey.

All writers are agreed that movable kidney is very frequently associated with chronic nervous disorders of the kind described. That these are related as cause and effect is not so generally held, but the steadily increasing evidence that is being brought forward to show that fixation of the kidney is followed by permanent relief of the symptoms must render untenable the position of those who contend that the association is merely coincidental.

As already stated, it is very difficult to explain on mechanical and purely reflex grounds the diverse symptoms of which movable kidney may be the cause. Anyone who carefully considers them cannot but be struck by their close resemblance to the symptoms of chronic Bright's disease, influenza, typhoid fever, and other diseases in which toxæmia plays an important part. The natural outcome of this reflection is an examination of such evidence as is obtainable as to the possibility of movable kidney being the cause of an auto-intoxication, and, if so, of its nature.

First, to consider the reasons advanced by those who deny the existence of such a toxæmia.

"Now, although it is possible that such an acute disturbance (obstruction of both ureter and blood-vessels) in the urinary functions may produce toxæmic symptoms, the conditions met with in chronic cases of movable kidney are not in the least likely to do so. . . . The suggestion that the neurasthenic symptoms, loss of weight, etc., which a certain number of such cases exhibit, may be regarded as toxæmic, is quite unwarranted. The urine in these chronic cases shows, as a rule, nothing abnormal whatever."—Wilson and Howell.

This argument expresses, in the main, the views of those who deny the existence of toxæmia in chronic cases of movable kidney. They assert that, as a rule, the urine shows no abnormal changes, and that therefore renal function is not impaired.

No conclusive evidence is brought forward to support the assertion that the urine is unaffected. Before such a statement can be substantiated, careful examination of many specimens, while the patient is up and about, must be made. It is necessary to collect the urine over a series of several consecutive days, as well as to submit a specimen from each day's output to careful chemical and microscopical examination. The routine examination of a single specimen of urine is of little value as a test of renal efficiency. The absence of albumin and of tube-casts on a single occasion, or even on several occasions, does not prove that the function of the kidneys is unimpaired. Especially is this so in the case of renal mobility. Rose Bradford has shown how rapidly the kidney recovers from the effects of ureteric obstruction, but with diminished secreting capacity. In the intervals of obstruction the urine may be healthy, but while the ureter is blocked, or the kidney congested by venous obstruction, secretion is seriously interfered with. That such temporary interference does damage to the kidney

is abundantly evident from the condition found at operation. Another fallacy in movable kidney is that the condition ceases to give trouble when the patient is lying in bed, and an examination of the urine at such time will probably be negative.

Plenty of evidence is forthcoming to prove that the urine in nephroptosis very frequently shows evidence of pathological changes in the kidney. Goelet states that for three years the urine of all patients going to him with prolapse of the kidneys was examined microscopically. He found that 75 per cent. showed evidence of inflammation of the pelvis or of the urinary tubules. Suckling states that albuminuria is very common ; that it disappears when the kidney is supported, and reappears when the kidney is again allowed to drop. William Fearnley, of Hull, describes the case of a lady, 41 years of age, whose urine contained albumin for ten years. Bright's disease was diagnosed by the late Sir William Roberts, though no casts were discovered. Fixation of the right kidney, which was freely movable, was followed by a complete cure. Dr. Tidey records a case in which the efficiency of a left movable kidney, as tested with methylene-blue and Luy's separator, was found to be very much impaired. Aufrecht relates two examples of so-called "orthotic" albuminuria, in which the albumin entirely disappeared when the kidneys were supported with Glénard's belt. The urine of a considerable proportion of my own cases contained albumin, sometimes in large quantity. Almost invariably this disappeared after fixation of the kidneys.

A careful examination of such evidence as I have been able to obtain from the literature of the subject, together with my own experience, leads me to the conclusion that it is exceptional for the urine to be consistently healthy when there is renal mobility in association with ill-health.

The evidence in favour of the theory that mobility does interfere with renal function and gives rise to chronic

toxæmia will be discussed in the form of answers to the following questions:

1. Does the urine show evidences of alteration in renal activity?
2. Does the kidney show pathological changes likely to interfere with its functions?
3. Does experimental obstruction of the ureter and torsion of the renal pedicle produce changes in the kidney analogous to those seen in kidneys that have been movable?
4. Does impairment of renal function cause general toxæmia?

1. The urinary symptoms of chronic movable kidney have already been discussed. Suffice it to say that a careful examination of the urine secreted over a period of several days, with the patient up and about, reveals definite evidences of renal irritation in a large percentage of cases. Albumin is common, sometimes in traces, at other times as a dense cloud, and this not only in different cases, but in the same case at different times. Casts are not common, but isolated tubule cells, and cells from the kidney-pelvis, are frequently found.

All are agreed that the more serious accidents which may befall a movable kidney are associated with marked urinary symptoms. Obstruction of the ureter causes diminution or entire suppression of urine. This occurs even when the other kidney is healthy, the function of the latter appearing to be reflexly inhibited. Suppression is succeeded by secretion of large quantities of pale urine, poor in solids, and frequently containing albumin. Very similar symptoms follow torsion of the renal pedicle, but the urine may then contain blood and even blood-casts. Charles P. Noble records 6 cases of hæmaturia occurring in movable kidney as a result of torsion, and David Newman records several others.

The first question may therefore be answered in the

affirmative. The urine does furnish striking evidence of altered renal function in acute cases of movable kidney. In chronic movable kidney, similar, though less pronounced, evidence is forthcoming in a large percentage of cases.

2. The answer to this question is contained in the preceding chapter. A very large proportion of movable kidneys show structural changes amply sufficient to justify the conclusion that their function has been interfered with. In cases of long-standing mobility the kidney is usually small, pale, and flabby. The capsule is thick and opaque, and strips less easily than normal. There is some atrophy of the cortex, there are degenerative changes in the tubule cells, and some increase of interstitial tissue. The intra-renal portion of the pelvis is dilated, and the apices of the pyramids are flattened.

It is difficult to believe that the factors which cause these structural changes in the kidney do not seriously interfere with its functions.

3. Some valuable researches have been carried out for the purpose of ascertaining the effects of obstruction of the ureter, venous congestion from blockage of the renal vein, and temporary occlusion of the renal artery, upon the structure and function of the kidney.

Sir J. Rose Bradford carried out a series of experiments upon dogs. He completely occluded one ureter for periods of ten to forty days. The kidney was then drained, a urinary fistula being established by fixing the proximal part of the ureter in the abdominal wall. After allowing free drainage for periods of from one to seven weeks, he killed the animals. The kidneys were found to have resumed their normal shape, but to have diminished in size, in some cases consisting of only a quarter of their previous bulk. The organ was a miniature specimen of a perfectly normal kidney. There was no increase of interstitial tissue except along the course of the larger vessels. The nuclear staining of the renal cells was not affected, but

their protoplasm had lost all its granules and appeared clear and glass-like.

Bradford attributed the atrophy to—

i. Diminution in size of the renal cells.
ii. Disappearance of many tubules.
iii. Crowding together of the remaining tubules.

Wilson and Howell completely occluded the ureter of a cat for forty-eight hours. At the end of that time the abdomen was re-opened and the obstruction removed. In this way a condition of affairs analogous to an attack of obstruction of the ureter in a case of movable kidney was artificially produced.

Fourteen days later the cat was killed and the kidney examined. The intra- and extrarenal portions of the pelvis were considerably dilated. Sections of the kidney showed great vacuolation of the renal epithelium, the glass-like globules being of a fatty nature.

Wilson and Howell regard the small, pale, movable kidney showing a slightly dilated pelvis as one of the earlier stages of Rose Bradford's experimental specimens. Like them, "not differing much in outward appearance, capable of recovering themselves to a certain extent on the removal of the intermittent attacks of obstruction, but nevertheless considerably impaired in function—an argument which those who say that movable kidney is a condition of no importance must find it difficult to refute."

De Souza (*Journ. of Phys.*, 1901) carried out a series of experiments to show the effect of venous obstruction on the secretion of urine. His results are summarized as follows:—

i. Partial or complete obstruction of the renal vein always causes a cessation or diminution of urinary secretion. This cessation does not occur immediately.
ii. The flow of urine is directly proportional to the velocity of blood-flow through the kidney.

A. P. Beddard (*Journ. of Phys.*, 1902) experimented upon the effect of obstruction of the renal artery. His conclusions are :—

i. Ligature of the renal artery cuts off all the glomeruli from the circulation and stops urinary secretion.

ii. Rapid degeneration of the epithelium of the renal tubules follows the cutting off of arterial blood supply.

These experiments conclusively prove that accidental interference with the escape of urine from the pelvis or with the renal circulation does impair the function of the kidney and does cause serious permanent injury to the secreting structures. Further, the changes in function and structure are similar to those found in kidneys which have been movable, and appear to have been caused in the same way.

That removal of nerve-influence, except in so far as it affects the circulation, does not interfere with renal function, is shown by an experiment of Rose Bradford's. He completely divided the nerves of one renal plexus. No marked change, either in the general economy, or in the amount and nature of the urine, followed. Subsequently the opposite kidney was excised, so that one kidney only, and that without direct connexion with the nervous system, was left to carry on the work of excretion. No definite change in urinary secretion or general health occurred.

4. Does interference with renal function cause general toxæmia ? The answer to this question cannot be better prefaced than by Senator's definition of Uræmia (Nothnagel's " Encyclopædia of Practical Medicine "). He says : " Uræmia may be defined as an auto-intoxication by nitrogenous substances, depending on a disturbance of the renal function and accompanied by the decomposition of albumin (plasmolysis), leading to abnormal acid formation (acidosis)." Senator also states " that functional disturbance may be caused mechanically by obstruction of the renal tubules or of the larger urinary passages, prevent-

ing sufficient evacuation of the excrementitious substances and injuring the renal parenchyma through stagnation of the contents."

Wells, in his work on "Chemical Pathology," states that normal urine does not contain toxic matter, and when injected into animals does not cause uræmic symptoms. These symptoms appear to be caused, not by substances normally eliminated in the urine, but by an arrest in the normal series of reactions by which the protein molecule is broken up into its "building-stones," the various amido-acids. One of these appears to be carbamate of ammonium, which is toxic. It is probable, however, that many toxins are formed, and produce widely different symptoms. Thus it is that drowsiness, heart-weakness, and syncope, or convulsions, and other evidences of irritation of the nervous system may be caused by renal inefficiency.

Wells concludes by saying that renal inefficiency blocks the reaction of katabolic metabolism, and causes an accumulation of urea-antecedents in the body.

It is clear that the breaking-up of the complex protein molecule into the nitrogenous constituents of normal urine is the result of a long series of reactions, and that many substances are formed in between. Exactly how far up the chain of reactions the arrest caused by renal inefficiency occurs is uncertain. Very interesting, in this connexion, is the work of Weichardt on the "Chemistry of Fatigue." He claims to have demonstrated toxic material formed from the protein molecule in the first stages of decomposition. To this he attributes the symptoms of general intoxication observed in extreme fatigue. These may be so severe as to resemble an acute febrile disease, and may last several days. Similar toxins have been described as present in mental fatigue.

One of the most characteristic symptoms of movable kidney is fatigue. Constant "tiredness," languor, and rapid exhaustion under slight physical and mental exertion

are very common complaints. This suggests that these symptoms may be caused by arrested katabolic metabolism high up in the chain of reaction, and the accumulation of fatigue-toxins in the body.

Whether the so-called "internal secretion" of the kidney plays any part in the production of uræmia is uncertain. By some this secretion is held to inhibit metabolism. Certain it is that diminution of renal tissue beyond a certain point leads to excessive katabolism. Rose Bradford has shown that when three-quarters of the total kidney tissue is removed, death occurs, with profound tissue-wasting and asthenia. And yet the urine contains more urea than that of a healthy animal with two whole kidneys. The muscles also contain a large excess of nitrogenous extractives.

To sum up: the urine in all the acute accidents of movable kidney gives unmistakable evidence of great interference with the functions of the kidney, and of severe injury to its secreting structures. In a large proportion of cases of chronic renal mobility the urine at times shows impairment of renal function and irritation of the kidney. Definite pathological changes are manifest in many movable kidneys at the time of operation, and this when there were no local symptoms definitely attributable to the mobility. Experimentally, it has been abundantly proved that ureteric obstruction and torsion of the pedicle—accidents to which a movable kidney is constantly liable—do greatly impair renal function and cause serious structural damage. Further, it has been shown that partial interference with the renal circulation or outflow of urine produces similar effects, though to a less degree. The structural changes experimentally produced bear a close analogy to those found in kidneys that have been movable. Finally, it is generally agreed that impairment of renal function, whether the result of mechanical causes or of disease, does cause an accumulation of katabolic products, some of which are

toxic. In other words, auto-intoxication results, which in its more severe forms is known as uræmia.

On this evidence, taken in conjunction with the clinical manifestations of movable kidney, it is difficult to arrive at any other verdict than that kidneys which are movable are frequently unable freely to eliminate the body's waste products, and that these accumulate and cause a general toxæmia.

The mechanical and toxic theories are not antagonistic but complementary, and probably both factors play a part in producing the chronic ill-health and lowered efficiency that are so often found in association with nephroptosis.

CHAPTER VII

DIAGNOSIS

The existence of a loose kidney is frequently missed because it is not specially sought for. Further, an abdominal examination is generally made with the patient recumbent when even very movable kidneys usually occupy a more or less normal position. Unless means are taken to displace the kidney from under the ribs, the fact that it is movable will be overlooked.

The physical examination for movable kidney is not so simple and easy as one might imagine, and it is not surprising that even competent observers not infrequently fail to detect the condition. A movable left kidney is especially liable to be overlooked, for reasons which will be referred to later. Inability to feel a loose kidney may be due to the stoutness or nervousness of the patient. In very stout people it may be quite impossible to palpate the kidney, no matter how movable it is ; while it may be difficult to get a nervous patient to relax the muscles of the abdominal wall sufficiently. Most of the failures are, however, due to defective methods of examination.

In order to obtain complete and accurate information as to the extent and character of displacement of kidneys, it is essential that the examination should be systematically carried out. The cardinal fact that displacement is determined in almost all cases by posture must be remembered and the examination conducted accordingly. In every case the patient should be examined when lying down,

when standing up, and when lying on the opposite side. In the recumbent position more complete relaxation of the abdominal muscles can be obtained, the kidney can be more easily identified, and its size and outline more accurately ascertained. In such a position, however, a freely movable kidney often returns to the renal fossa and may be difficult to feel. I would emphasize at this point that it may be quite impossible to feel even a very loose kidney with the patient lying down, no matter how much she may be instructed to take deep breaths. Even coughing does not always dislodge the kidney, and on the left side this is frequently the case. The movements of the diaphragm are not communicated directly to the left kidney. The downward thrust of the diaphragm during a cough mainly affects the hollow stomach, which acts like an air-cushion and minimizes the effect of the shock upon the kidney. Many times I have entirely failed, while the patient was lying down, to palpate a left kidney which in the erect position fell altogether below the costal margin. I believe that mobility of the left kidney is frequently overlooked because during recumbency it is much more difficult to detect than is mobility of the right kidney, and it is not sought for in the erect position.

Very valuable information is often obtained by placing the patient in a lateral position. She is instructed to lie almost over on the opposite side with the legs drawn up so that the thighs are flexed nearly to a right angle. This ensures relaxation of the abdominal muscles. In this position the intestines fall away from the front of the loin, and the kidney, if it has any lateral mobility, will tumble out of the renal fossa and fall into a position where it can be very readily felt. This test is useful not only because it reveals abnormal mobility, but also because it enables an estimate of the extent of lateral movement to be obtained, a point of considerable importance when deciding whether the displacement can be successfully controlled by special

belts or trusses. If a kidney can move freely in a horizontal direction it is almost impossible to control it by such contrivances.

In order to obtain full information respecting a possibly mobile kidney, it is desirable, as already remarked, to examine the patient when standing up, while recumbent, and when lying on the opposite side. Neither position is altogether satisfactory, but the disadvantages of one can, to a large extent, be discounted by subsequently placing the patient in the others. In the erect position the extent of the displacement can be better estimated, and kidneys can often be felt which are not palpable during recumbency. On the other hand, it is more difficult to obtain relaxation of the abdominal muscles, and less easy to estimate variations in the size of the kidney, when the patient stands up. It is my practice to examine patients in all three positions, as only in that way can full information be obtained.

Examination in the recumbent position.—The abdomen is completely uncovered, and all tight garments loosened. The patient lies on a firm, roomy couch of convenient height and ample length. Both sides of the couch should be equally accessible to the examiner. The shoulders and upper part of the trunk are raised on an inclined plane, and a small pillow is placed under the head. If the patient is nervous, or the muscles are rigid, a second pillow may be placed under the knees, to allow slight flexion of the thighs without effort on the part of the patient (*see* Plate II). The examiner sits on the side to be examined. It is impossible satisfactorily to examine both loins from the same side. A general examination of the abdomen is first made with a view to excluding other abnormal conditions, and at the same time gaining the patient's confidence. Then, if the right kidney is being sought for, the loin is enclosed by the left hand in such a way that the thumb occupies the angle between the last rib and the outer edge of the erector spinæ muscle, while

PLATE II.—Recumbent position.

PLATE III.—Position of right hand in palpation of left loin The examiner's left hand is at liberty.

the fingers lie in front. The patient is instructed to allow the back to rest comfortably on the couch and to take a series of long, deep breaths. During the first few breaths no attempt is made to entrap the kidney. When confidence has been obtained and breathing is going on satisfactorily, the loin is firmly grasped between the left thumb and fingers at the end of an inspiration. If the kidney comes below the costal margin its presence is at once detected, and if definitely movable it can be held. If the kidney is not felt, it may be above or below the approximated thumb and fingers. While the loin is still grasped as above, a careful examination of the abdomen below should be carried out with the right hand, which is kept free. If the kidney is discovered below, attempts should be made to push it back into the loin, the grasp upon which is relaxed to allow of its return. If this manœuvre can be executed it is proof that the lump felt is the kidney. Finally, if the kidney cannot be felt by the left hand, nor its presence lower down be detected by the right hand, the patient should be instructed to cough, with the object of dislodging it. In the right side this is often successful, but, as already explained, coughing not infrequently fails to dislodge even a very movable kidney, and the condition may easily be overlooked if no examination in the erect position is made.

To examine for the left kidney the surgeon sits on the left side of the patient and grasps the loin with his right hand in the way described (*see* Plate III). The left hand is now at liberty to explore the lower abdomen or palpate the imprisoned kidney.

Whilst held by the hand which grasps the loin, the kidney can be carefully examined by the free hand, any variations in size or other abnormalities being noted.

This method of examination is easy to carry out, very effective, and does not alarm or incommode the patient. It has several advantages over the usual bimanual method. In the bimanual method novices are apt to compress the

loin too forcibly between the fingers of the two hands and so prevent the descent of the kidney. Again, it is more difficult to imprison the kidney and more difficult to differentiate a loose kidney from an enlarged gall-bladder or a Reidel's lobe of the liver, which may also descend between the fingers. Last, and most important, the bimanual method occupies both hands, and the great advantage of a free hand with which to examine the kidney while it is being held by the other is lost.

Examination in the lateral position (Plate IV).—The patient is made to lie on the side opposite to the one to be examined. To obtain muscular relaxation it is essential that the position should be a comfortable one. The legs are drawn up and the thighs flexed almost to a right angle, while the uppermost arm is allowed to hang loosely in front of the chest. It facilitates the examination if the lower hip is a little in front of the upper one, but not sufficiently so to necessitate muscular effort to maintain the position. The effect of this is to cause the slope of the uppermost part of the abdominal wall to be less steep and necessitates less stooping on the part of the examiner when palpating it.

In this position the omentum and small intestines fall into the undermost half of the abdominal cavity, leaving the uppermost half relatively empty. The kidney, if loose, will swing or fall inwards and can readily be detected.

The special advantages of examination in the lateral position are that it enables the novice most easily to detect an abnormally movable kidney, and that it enables a better estimate of the degree of lateral movement to be formed than is possible with the patient lying on her back or standing up. It is not at all unusual to find that the kidney falls almost to the middle line. In this position also rotation of the kidney is most easily detected, and the differential diagnosis between loose kidney and intra-abdominal lumps such as Reidel's lobe of the liver, an enlarged gall-bladder, and intestinal growths is facilitated.

PLATE IV —Examination of right loin in the lateral position.

PLATE V.—Examination of right loin in the erect position.

PLATE VI.—Examination of left loin in the erect position.

Examination in the erect position.—The patient's skirts are loosely fastened in such a way that they are suspended from the hips without its being necessary for her to support them with her hands. She is then asked to stand with the body slightly bent forwards and the hands resting on the back of a chair. The examiner stands behind. For the right loin the right hand is used, the thumb, as before, occupying the angle between the last rib and the erector spinæ muscle, and the fingers lying in front, immediately below the costal margin (Plate V). To examine the left loin, the left hand is similarly placed (Plate VI). In this way the whole of the loin can be readily palpated, and the kidney, if down, grasped between the thumb and fingers. The level it assumes under the influence of gravity, and the effect upon it of respiration, can be ascertained. In this position deep breathing and coughing are more likely to bring the kidney within the grasp of the hand than during recumbency.

If desired, a loose kidney detected in this way can be held while the patient lies down, and then examined more carefully.

X-Ray evidence and pyelography.—In thin persons the outline of the kidney may be demonstrated on ordinary X-ray films, and many excellent skiagrams showing displacement have been obtained. This method is, however, unreliable, and negative results have no value.

The most exact information not only as regards the range of mobility, but also of the effect of the displacement upon the ureter and renal pelvis, is obtained by means of pyelograms taken in the upright position (Plates VII, VIII). Although not generally necessary to establish the diagnosis or the advisability of nephropexy, they are invaluable in doubtful cases. A pyelogram taken when the patient is lying down is of little value and may be very misleading. It is essential that a photograph in the upright position

should be obtained before an opinion as to the degree and effects of the abnormal mobility can be formed.

There are one or two signs which, though not in themselves diagnostic, yet suggest renal mobility. When the kidney is movable the loin has a different feel: it is softer, and gives an impression of emptiness. Again, percussion over the area immediately around the angle between the erector spinæ and last rib while the patient stands with the body slightly inclined forwards, often elicits a resonant note when the kidney is displaced. These signs are especially useful when rotation of the kidney without downward displacement is suspected. It may be impossible to palpate such a kidney in any position of the body, and a diagnosis has to be based on symptoms, the signs just mentioned, and careful examination of the urine for evidence of interference with renal function. Not infrequently such kidneys give rise to albuminuria.

DIFFERENTIAL DIAGNOSIS

The conditions which may be mistaken for a movable kidney are :—

1. Reidel's lobe of the liver.
2. An enlarged gall-bladder.
3. A growth of the colon, or an impacted mass of fæces within it.
4. Pyloric tumour.
5. An enlarged ovary.

1. **Reidel's lobe of the liver.**—Not infrequently, in women, a long, tongue-like extension of the right lobe of the liver is met with. Occasionally it extends downwards as far as the anterior superior spine, and may be connected with the main mass of the liver by a mere band of fibrous tissue. The lobe is thickest at its upper end and tapers to a thin sheet below. It lies in front of the loin in close contact with the abdominal wall, and has a considerable degree of lateral mobility. Reidel's lobe is probably a con-

genital abnormality, but has been regarded as resulting from pressure by tight corsets. Such a lobe may closely simulate a movable right kidney, as exemplified by the following case :—

In December, 1907, I performed double nephropexy upon a woman, twenty-nine years old, for severe gastric disturbance associated with neurasthenia. The wounds healed by first intention. In August, 1908, I saw her again. Her general health was better, but she still complained of pain after food and occasional vomiting. On examining the abdomen a lump was felt in the right side which closely resembled a loose kidney. It lay near the outer edge of the rectus muscle, moved with respiration, and appeared to be separate from the liver. The lump could not be completely pushed back into the loin, nor could it be made to disappear under the ribs. This, however, is not unusual when a kidney which has been once fixed subsequently becomes loose again. The patient was examined by different persons, who agreed that in all probability the lump was a displaced kidney. I again opened the loin, and then discovered that the supposed kidney was a process of the liver which was attached to the main mass by a thin, hinge-like layer of fibrous tissue, that allowed of free lateral movement independently of the liver. The right kidney was firmly anchored in its normal position.

The main points of distinction between a movable right kidney and such a process of the liver are that the latter cannot be reduced into the loin, does not assume a lower level when the patient stands up, and the hand cannot be passed above it. There is impaired resonance on light percussion over a Reidel's lobe but not over a movable kidney. The most reliable evidence is obtained by examining the patient in the lateral position. The lobe then swings over towards the middle line and the kidney can be palpated in the loin.

2. **An enlarged gall-bladder.**—The points of dis-

tinction between a movable kidney and a Reidel's lobe of the liver serve also to differentiate the former condition from an enlarged gall-bladder. In addition, the history and general symptoms will usually reveal some indication of the cause of an enlarged gall-bladder. Considerable difficulty is sometimes experienced in distinguishing between a tender kidney which is displaced inwards, and a diseased gall-bladder. The kidney may lie in the position of the normal gall-bladder and have little tendency to return to the loin. The difficulty in diagnosis is increased when the temperature is raised, and on three or four occasions I have opened the abdomen expecting to find an inflamed gall-bladder when the actual cause of the symptoms has been a displaced kidney lying immediately behind the gall-bladder and presenting signs of mild pyelitis. It is necessary then to close the abdominal wound and to replace the kidney from the loin.

3. **Growth of the colon.**—A growth of the colon may easily be mistaken for a movable kidney, and vice versa. On one occasion I was asked to see a woman with a hard, tender lump in the right iliac fossa, which was supposed to be a malignant growth of the cæcum. With some little difficulty the lump was pushed upwards and made to disappear into the loin.

On another occasion a patient was referred to me by a gynæcologist on account of a lump in front of the right loin which he regarded as a displaced kidney. The lump had the outline of a kidney and was freely movable. She was admitted to a nursing home for nephropexy. A statement by the nurse that the result of an aperient followed by an enema was not satisfactory led to a more careful examination, with the result that the lump was discovered to be a growth in the hepatic flexure of the colon.

Once, also, I discovered in the course of operation that a lump in the loin which had been diagnosed as a displaced kidney by the patient's own doctor, by a consulting phy-

sician, and by myself, was a growth in the ascending colon. Fortunately the patient's husband was in an adjoining room and his consent to resection of the colon obtained.

Tumours caused by growths of the colon or fæcal masses within it have not the characteristic " slip-up " of a movable kidney, nor can they be reduced into the loin. When there is a doubt as to whether the lump is a kidney or not, a careful attempt should be made to palpate the lower pole of the kidney in its normal position. If this can be done the lump cannot be renal. In doubtful cases it is advisable to make a pyelogram and to have an X-ray examination of the colon made after a barium enema has been given.

4. **Tumour of the pylorus.**—A pyloric tumour is sometimes very freely movable, and may be mistaken for a mobile right kidney. Such a lump may be made to disappear under the ribs, but cannot be pushed back into the loin. Associated stomach symptoms generally make the diagnosis easy.

5. **An enlarged ovary.**—Several cases are recorded, and I have come across one in which a right kidney within the cavity of the true pelvis has been mistaken for an enlarged ovary. If such a condition is suspected a diagnosis can usually be made by raising the pelvis of the patient and making upward pressure upon the lump from the vagina. A displaced kidney will ascend into the abdomen, where it can be identified.

In view of the possibility of mistaking an intra-abdominal lump for a displaced kidney, and also to exclude associated intra-abdominal lesions, I now invariably open the peritoneum from the right loin before proceeding to replace the kidney. Through the opening a hand is introduced, and a systematic exploration carried out. In this way the gall-bladder, pylorus, colon and pelvic organs can readily be palpated. The principle that an abdominal section should include a general examination as well as the operative procedure for which it was primarily undertaken, usually

applies to the operation for a displaced kidney. Particularly is it advisable to open and explore the peritoneal cavity, owing to the frequent association of chronic appendical disease with displacements of the right kidney. So common is this association, that it is now my invariable practice to remove the appendix before replacing the kidney. This can almost always be done through the incision in the loin.

The acute attacks associated with sudden recent displacement of the kidney, or torsion of its pedicle, may simulate :

i. Renal calculus.
ii. Gall-stone colic.
iii. Appendicitis.

i. **Renal calculus.**—Dietl's crises may very closely resemble attacks of renal colic caused by a stone. The urine may contain blood in both cases, and it is probable that before the introduction of X-rays many rotated and mobile kidneys were needlessly explored for stone. In all doubtful cases an X-ray examination is necessary to clear up the diagnosis. In this connexion it may be stated that in the acute attacks brought about by torsion of the renal pedicle and partial strangulation of the kidney, there is often more severe collapse than in the colic of renal calculus and gall-stone impaction. The pulse is feeble and the patient obviously very ill, the clinical picture having a close resemblance to acute intestinal obstruction.

ii. **Gall-stone colic.**—This may very closely resemble the symptoms of torsion of the renal pedicle. In each case there is severe pain and tenderness in the right hypochondrium, vomiting, and more or less collapse. The presence of jaundice would indicate gall-stones ; while albumin or blood in the urine would indicate renal strangulation. The history will often give a clue to the nature of the attack. The patient may have had jaundice in the past, or be known to suffer with a movable right kidney. The attack, in gall-stones, may come on at any time : torsion of the kidney

pedicle is nearly always the result of strain, and occurs while the patient is actively engaged. In doubtful cases it may be necessary to explore the biliary system to positively exclude gall-stones.

The following case is an instance of the difficulty sometimes experienced :—

In the early part of 1909 a young woman, twenty-nine years of age, was sent to me by Dr. W. Garman. For two years she had had, at intervals, severe attacks of pain in the right side. On one occasion, eighteen months before, she had been jaundiced. The pain seemed to be brought on by exertion, and was very severe ; it was accompanied by vomiting. Her general health was fairly good, except that she easily became tired and suffered with " indigestion." The right kidney could be grasped. No lump could be felt in the gall-bladder region, nor was there any tenderness in the right hypochondrium.

Some months later she was admitted into the General Hospital, Birmingham, where the possibility of duodenal ulcer was considered. In the absence of any objective evidence nothing was done, and she returned home. The attacks of pain continued and became more severe. In October, 1909, she came to see me again. There were still no objective signs except the mobile right kidney. Operation was decided upon. The loin was opened by the usual vertical incision, but before fixing the kidney the peritoneum was opened and the gall-bladder and bile-ducts were examined. The gall-bladder, which was small and deeply placed under the liver, contained several stones. The kidney was fixed in place, and the gall-stones removed by the usual abdominal route.

This case contrasts with that already referred to (p. 26), in which a lady was seized with acute pain in the right side of the abdomen while laughing immoderately in a theatre. An acutely tender lump developed in the right hypochondrium, and a diagnosis of gall-stones was made. As the

acute symptoms subsided the right kidney was found to be very mobile and tender. Nephropexy was followed by complete cure.

iii. **Appendicitis.**—Not infrequently, in movable right kidney, the pain is referred to a spot internal to the anterior superior spine, and it may then be very difficult to say whether it is due to the kidney or to an inflamed appendix. The difficulty in distinguishing between symptoms due to the appendix and those caused by torsion or inflammation in displaced kidney is increased by the knowledge that the appendix may be directed upwards lying on the outside of the colon and with its tip at the level of the renal fossa. A very careful consideration of all the evidence available is called for, and unless appendicitis can be definitely excluded, operation should be advised. The following cases illustrate the difficulty :—

In 1907, with Dr. Suckling, I saw a girl, twenty-four years old, who for some time had suffered from attacks of pain in the right side. The pain was referred to the loin and right lower abdomen. The right kidney was very movable, while there were no objective signs of appendicitis. Nephropexy was performed. For some time she was better, but a year later I was asked to see her with general peritonitis from a perforated appendix. After a tedious convalescence she ultimately recovered, and has remained well since. Very possibly the pain throughout was due to the appendix rather than to the kidney.

In October, 1908, a girl, aged twenty-three, was sent to me by Dr. Tangye, of Coventry. For three months she had had pain in the right side. The pain began in the loin and radiated into the iliac region. It was not affected by exercise, but was worse at night. The right kidney fell completely below the ribs in the erect position, and was slightly tender. There were no objective symptoms of appendicitis, but the character of the pain suggested possible appendical origin. The appendix was removed from the

loin, and the right kidney fixed. The appendix was very long, but apparently healthy. In this case the pain was probably caused by the kidney alone.

In April, 1909, I saw, at Dr. Huxley's request, a nurse, aged twenty-three. While lifting a heavy patient three weeks before she felt a sharp pain in the right side. The pain increased, and she had to lie in bed. While in bed the pain was severe, and was made worse by the least exertion. The right kidney was tender and very movable. There was also marked tenderness, but no swelling, over the appendix. As before, the appendix was examined and removed from the loin before the kidney was fixed. No evidences of inflammation were found in the appendix.

The following case illustrates the difficulties in diagnosis that may be encountered :—

In February, 1921, I saw in consultation with Dr. George St. Johnston a married lady aged forty-two. In 1909, when thirty years old, she had for the first time a violent attack of pain in the right side which was thought to be renal colic. In 1915 and 1917, and just recently, there were similar severe attacks. In between these she had had " reminders " similar in character but less severe. The attacks of pain had always occurred when she was up and about, except the last, which started whilst she was in bed. Each attack was followed by epigastric tenderness. Her general health was excellent and she had never suffered from jaundice, the only disturbance of function being a constant desire to urinate, which, however, she was able to control. After each severe attack she had been seen by specialists both in Birmingham and London, and suggestions that the attacks were due to the kidney, gall-bladder, and appendix had been made. In the absence of any physical signs to support a definite diagnosis she had declined operation. X-ray investigation for renal calculus gave a negative result. On examination she presented no general signs of ill-health beyond slight anæmia. There was no

tenderness anywhere in the abdomen nor in the loin, and while lying down nothing abnormal was discovered. On standing up the right kidney fell some distance below the ribs, and its lower pole was on a plane some distance below the umbilicus. So definite was the displacement that the patient could feel the kidney herself, and she then consented to have it replaced by operation. The usual incision was made in the loin and the peritoneum opened in the routine way. The gall-bladder was found to be tightly packed with stones and the appendix grossly diseased. Both the gall-bladder and the appendix were removed through the loin incision, and the very mobile kidney anchored. The operation findings did not answer the doubt as to the origin of the acute attacks of pain, but did emphasize the importance of not treating the obvious lesion without looking for possible associated disease.

CHAPTER VIII

SYMPTOMS: LOCAL

It is frequently stated that a large percentage of cases of movable kidney never suffer from any symptoms. Such a statement is misleading and unsupported by facts. It is perfectly true that a loose kidney may be found in a person who is apparently quite well, but it is untrue that many such persons pass through life without being handicapped in any way by the mobile kidney. It is also true that many septic teeth may be found in the mouth of a person who is in good health and who neither complains of pain nor of dyspepsia, but it would be untrue to assert that many such cases never develop symptoms attributable to the bad teeth. That such teeth may set up serious trouble in parts of the body far distant from the mouth has only been appreciated within recent years. Teeth which formerly were passed over in the absence of local symptoms are now condemned for the part they play in causing and maintaining general ill-health. A man may absorb excessive quantities of alcohol for years without apparent harm, but sooner or later evidences of injury become manifest.

A careful and unprejudiced study of the past history of a large number of cases with definite renal mobility, together with close observation of persons known to be suffering from such a condition, cannot fail to bring the conviction that a movable kidney does almost always diminish working efficiency. It interferes with the physical or mental powers, or with both, in greater or less degree. It is perfectly true

that many patients display no local symptoms that can be directly attributed to the kidney, but it is equally true that few escape without functional disturbance of some kind. It is not common to find definite renal mobility in perfectly healthy people above forty years of age. The condition may be found comparatively often among girls between twenty and twenty-five years of age, and may appear to cause little trouble. The number of these patients remaining well at the end of the next ten or fifteen years is, however, comparatively small. They seem unable to withstand the wear and tear of life, and break down in various ways. Sometimes the decline from the normal is gradual, each stage extending over a long period. In others the breakdown is more sudden, following childbirth, influenza, or an exceptional period of strain. A squint in a child is often said to have followed an attack of measles. The squint is not caused by measles, but is due to an error of refraction which the ocular muscles, enfeebled by the illness, can no longer disguise. So it appears to be with a movable kidney. While the patient is strong, its baneful influence is only slowly exerted; but if the general health becomes impaired by some extraneous influence, its effects are more acutely manifested.

When discussing the frequency of movable kidney, attention was drawn to the fact that it is a far more common condition among the victims of deranged function of the nervous system, the digestive system, and the genito-urinary system, than among other classes of patients and the healthy. In many instances no direct connexion between the functional derangement and the mobile kidney can be traced. The frequent association of the two conditions, however, is suggestive, and in many cases a direct connexion can be traced. The striking benefit which follows nephropexy in a large percentage of such patients is further evidence that movable kidney either causes or aggravates the general symptoms.

The effect of renal mobility is determined by many

factors, and the symptoms vary widely in different individuals. Given a movable kidney, the effect is greatly influenced by the occupation and inherited tendencies of its possessor. In a workman, local pain, due to strains and torsion of the pedicle, are common. In a brain-worker, neurasthenia, nervous dyspepsia, irritability of temper, and other symptoms of nervous exhaustion occur. In a person of neuropathic stock, profound neurasthenia, and even insanity, may result. The leisured housewife may go on in comparative comfort for years with a degree of renal mobility which in a shop assistant or a schoolmistress will bring about complete physical breakdown. Again, a sudden lowering of nerve force by illness or overwork will be perpetuated by a movable kidney. The patient seems to be unable to regain his former level. Often he will date his troubles from an attack of influenza, stating that he has never felt the same since. Finally, the local accidents which may attend renal mobility occur more often in some cases than in others. Rotation of the kidney, obstruction of the ureter, and torsion of the pedicle are accidents which complicate some cases, and never occur in others. These various factors associated with renal mobility are responsible for the widely differing symptoms in the production and prolongation of which the movable kidney plays an important part. It is only by careful analysis of clinical material, and close examination of the previous history of patients, that a just estimate of the part played by a mobile kidney can be formed. Its bearing upon certain groups of symptoms is, however, coming to be more clearly understood, with the result that it is becoming possible, with increasing certainty, to promise cure or relief by nephropexy to many who are incurable by ordinary methods of treatment.

The symptoms of movable kidney may be described as *local* and *general*. Local signs and symptoms are those connected with the urinary system and are referable to the kidney, the bladder and the urine.

PAIN

Pain is a very variable symptom in movable kidney. Many persons complain of no pain at all; others, of a dull ache, or mere feeling of discomfort, in the loin, lumbar region of the spine, and hypochondrium; others, again, of sharp pains starting in the loin and radiating into the abdomen, the groin, or along the spine; and a few suffer from the agonizing attacks of pain known as Dietl's crises.

Among cases of movable kidney without pain, when they come under observation, it is not uncommon to find that at one time pain referable to the kidney existed, but subsequently disappeared. This is not surprising. The pain of an unreduced dislocation is severe at first, but gradually subsides and may quite disappear. As symptoms of inflammation subside and the nerves become accustomed to the new order of things, pain may cease. The cessation of pain does not necessarily mean restoration of function. An old, unreduced dislocation of the shoulder may not be painful, but considerable impairment of usefulness persists. So it seems to be in movable kidney. Because the kidney has ceased to cause pain it does not at all follow that it is harmless.

Acute pain is due to sudden recent displacement of the kidney, to ureteral obstruction, or to partial strangulation from torsion of the pedicle.

Sudden displacement of the kidney is always the result of trauma, and occurs more often in men than in women. It may be caused by a violent strain or by direct injury to the back. The patient may feel that "something inside has moved." The pain is severe, and may be attended by considerable shock. It is referred to the loin, the back, and the hypochondrium, and is intensified by deep breathing and movement. The loin is acutely tender to deep pressure. Hæmaturia is not uncommon in these cases. The acute pain gradually subsides with rest in the recum-

bent position, but some pain usually persists, and if rotation of the kidney has occurred this is almost certain to be the case.

In April, 1906, I saw a powerful, well-built man, 39 years of age. He complained of pains all over the top of his head, sleeplessness, and pain in the right side, which prevented him from following his employment as an iron-worker. He had been perfectly well, except for an attack of gas-poisoning in the early part of 1905, until October 13th, 1905. On that day he was assisting several other men to lift some heavy blocks of steel from the ground on to a platform about 3 ft. high. While doing so he felt a sudden "kench in the right side, as though something had given way." The pain, which was accompanied by a feeling of sickness, compelled him to give up work. The pain in the right side was very severe for some time, and, though better, prevented him from resuming work. In December, 1905, a kidney belt was ordered. This partially relieved the pain in the side, but he began to suffer with severe pains in the head, sleeplessness, and loss of weight.

The patient was a powerful, muscular man, but was restless and depressed. The right kidney dropped below the ribs when he stood up. It occupied a position just external to the rectus muscle.

A middle-aged man was seen by me in consultation with the late Dr. Prichard of Banbury. Some time previously, while coming down a polished staircase he slipped. To save himself he grasped the banister with one hand, with the result that he swung round and struck his right side violently against the rail of the banister. He experienced intense pain in the side, and blood appeared in the urine. Subsequently, the pain in the loin returned whenever he exerted himself. On examination the right loin was tender and the kidney could be palpated. The kidney was explored and found to be displaced downwards and inwards. It was replaced, with complete relief of symptoms.

In April, 1913, I was consulted by a celebrated acrobat. He stated that he was quite well until sixteen months previously, when he sustained a severe strain while wriggling

Fig. 4.—Situation of pain in movable kidney. (*Suckling.*)

A, Pain round the right costal arch is commonly met with. It may be constant and paroxysmal, in the latter case resembling attacks of biliary colic. B, In the case of left movable kidney severe pain is often felt under the left costal arch, and this pain may pass round the body on the left side. C, Epigastric pain may be present, with pain, tenderness, and excessive pulsation of the abdominal aorta. Epigastric pain is generally associated with movable right kidney. D, Pain in the breasts may be present. E, Pain in the region of the appendix or ovary is also very frequent. F, Pain shooting down in the direction of the ureter and passing down the thigh is very common on one or both sides, according to the prolapse of one or both kidneys. This simulates the pain caused by renal calculus. G, Pain across the abdomen in this situation is very common. H, Pain down the outer side of the thigh is very frequent in movable kidney. I, Pain round the front of the neck is very common and can be explained anatomically. Severe attacks of pain at the period are usually most marked in the suprapubic region. In other cases the pain may be all over the abdomen, and most marked at the umbilicus.

out of a strait waistcoat which had been fastened on by some sailors. He experienced severe pain in his back and for two weeks there was blood in the urine. Since then wriggling side-to-side movements caused a pain in the

left loin. Lately, he had been subject to fits of depression and was moody and morose. He was a very powerful, muscular man of magnificent chest development. In spite

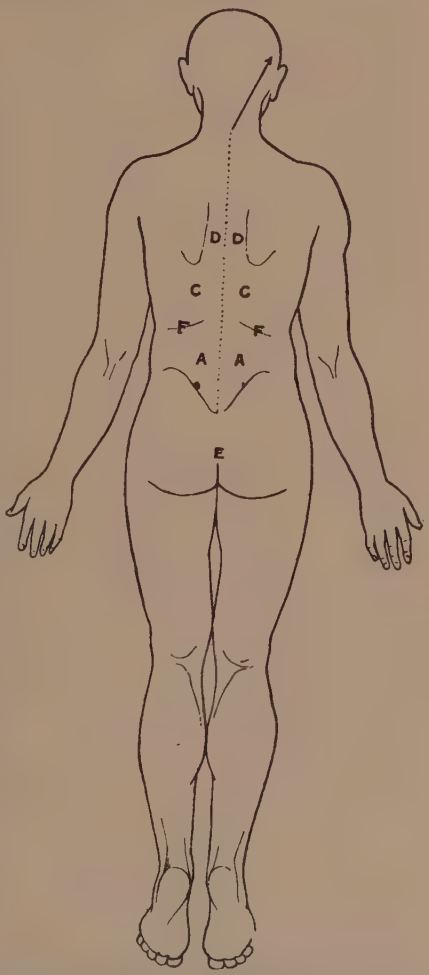

Fig. 5.—Situation of pain in movable kidney. (*Suckling*.)

In the majority of cases the pain in the back is in the position marked A on the diagram. This marks the normal area of renal dullness, which lies over the last rib F, and extends two inches below it, and extends also about two and a half inches outwards from the spine. This area should be absolutely dull on percussion if the kidney is in place; when the kidney is out of place, prolapsed or dropped, it is resonant, but the only certain method of diagnosis is by palpation. C, In other cases the pain is just under the scapula. When this occurs on the right side it is often put down to liver trouble. D, In other cases the pain is in the interscapular region on either side of the spine. E, The pain may be over the coccyx, and pass right up the spine, even right up the occiput; sometimes it runs along the centre of the back of the neck or on one side. Headache in the occipital region is very common. Numbness of the extremities may be present. It must be remembered that movable kidney may cause pain in either axilla and may be in the form of a girdle pain round one or both sides. The variety of these pains is easily explained by the connection of the renal plexus with various nerves. Headache may occur on one side of the head; it is frequently frontal, or over one or other eye, or it may be at the top of the head and quite localised. The pain is often occipital, and shoots down the spine or over the collar-bones.

of the thickness of his muscles the left kidney could be felt below the ribs. He was ordered a Treves' truss, from which he derived great benefit.

Severe pain also occurs when an already mobile kidney is

exposed to sudden strain by violent muscular effort or external violence.

Reference has already been made to the acute pain associated with obstruction of the ureter and torsion of the renal vessels.

Obstruction of the ureter by an aberrant renal artery.—A well recognized and by no means uncommon type of case is that in which severe symptoms are produced by kinking of the ureter over an aberrant renal artery passing direct from the aorta to the lower pole of the kidney. This is more likely to occur when the artery passes in front of the ureter. Obstruction only occurs when the kidney becomes abnormally mobile, the ureter then being dragged across the artery and kinked at a point just below its junction with the renal pelvis. The symptoms closely resemble those of calculus, and are characterized by intermittency, a degree of obstruction sufficient to cause severe pain being largely a matter of accident. The pain is definitely referred to the loin, which is tender and the attacks are typical of renal tension. Hæmaturia is rarely met with.

Illustrative cases.—A man, aged 23, was admitted into the Queen's Hospital, in February, 1928, with a history of intermittent attacks of pain in the left loin extending over seven years. The attacks occurred about once a week and usually at the week-end when he was away from work. Exercise relieved the pain, but he volunteered the statement that two years previously he was laid up with typhoid fever and during that time he was free from pain. The pain, a severe ache, was referred to the loin midway between the last rib and the iliac crest. Each attack was followed by the passage of an increased quantity of urine. The patient was a healthy man, and beyond some tenderness in the left loin no abnormal physical signs were present. The urine contained a haze of albumin but was otherwise healthy. At operation the kidney was found to be a little adherent but of normal size. An aberrant renal artery

passed in front of the ureter on its way to the lower pole of the kidney. The ureter above the artery was dilated, as was the renal pelvis.

A girl, aged twenty-one, complained of attacks of pain in the right loin of five years' duration. The pain was situated in the loin above the iliac crest. Each attack began insidiously, the pain steadily increasing until she lay down, when it gradually subsided. The duration of the attack was about twelve hours. On examination, pressure in the right loin evoked a sharp stabbing pain. The kidney was not felt and the urine was free from albumin. At operation, the kidney was found at a lower level than normal, the ureter was kinked over an aberrant renal artery passing in front of it, and the renal pelvis was dilated. The artery was divided and nephropexy performed. This was followed by complete relief of the symptoms.

Rotated kidneys usually cause a considerable amount of pain. The pain is more or less constant while the patient is up and about, and is made worse by exertion and stooping. Lying down quickly brings relief. I have seen a number of men who were incapacitated for work on account of pain of this type. In a majority of cases the right side was affected, and usually the kidney, though not very freely movable, is palpable. Several times I have explored the loin for pain dependent upon exertion without having been able to feel the kidney previously. In every case the kidney has been rotated, and in two instances was hydronephrotic and had to be removed. Rotated kidneys are usually met with in powerful, muscular men, and the pain disables them for work, involving severe or prolonged strain. I have seen the condition in coal miners, motor transport drivers, a policeman, a mining engineer, and in athletes. The pain is referred to the loin, and from there radiates forwards along the costal margin, and upwards to the shoulder-blade; only occasionally does it extend downwards into the groin. In all the cases the urine at times contained a little albumin.

The pain, in some cases at least, is due to obstruction of the ureter as it passes over the lower pole of the kidney.

The following case very well illustrates the symptoms and pathological results of rotated kidney :—

In September, 1908, I saw a man, forty-eight years of age, who complained of pain in the right side which prevented him from working. The pain was first noticed three or four years previously. It was " burning " in character, and referred to the right loin, from whence it extended forwards along the costal arch, upwards to the right shoulder-blade, and downwards towards the groin. It was always felt when standing up, and was much intensified by lifting and stooping. Lying down quickly brought relief. The pain increased in severity, and six months previously he was compelled to give up his work, which was heavy, on account of it. He was then seen by Dr. Suckling, who found the right kidney slightly prolapsed and displaced forwards. A belt was ordered. This relieved the pain to some extent, and it was no longer felt along the course of the ureter. Attempts to work, however, caused severe burning pain in the right loin and hypochondrium. In other respects the man had been perfectly well.

He was a powerful, healthy-looking man, weighing thirteen stones. He was kept under close observation for many months and examined many times. There was always tenderness in the gall-bladder region, but the lower pole of the kidney was only felt on one occasion. The urine occasionally contained a haze of albumin and a few tessellated cells, but in other respects was normal. An X-ray examination gave a negative result. Treatment by medicines had not the least effect upon the pain. The man constantly asserted that he always had pain when standing up, and that it always subsided when he lay down for a few minutes.

In March, 1909, Mr. Jordan Lloyd, at my request, explored the right kidney. There was some difficulty in finding

it, as it lay high up under the ribs and was very small. The kidney was removed. It was atrophied; the pelvis was much enlarged, and the renal tissue much shrunken. The ureter was of normal calibre, but entered the pelvis obliquely some little distance above its dilated lower portion. The kidney exactly resembled those experimentally produced by Wilson and Howell by ligaturing the ureter. The explanation appears to be that, as a result of rotation, the ureter was almost completely obstructed when the patient stood up and was patent when he lay down. The result of this constantly recurring complete obstruction was the production of a moderate hydronephrosis and great atrophy of the kidney. Such an explanation is in accordance with the experimental work of Rose Bradford and Wilson and Howell.

Lumbar ache.—Aching pain in the lumbar region of the back is very common. It is frequently associated with dragging pains in the fronts of the loins. The pain is probably due to traction upon the renal plexus and congestion of the kidney. The pain may be very slight, amounting to a mere sense of discomfort, or it may be a severe ache. It is almost always aggravated by active exercise and prolonged standing or sitting, and relieved by lying down. The distribution is very variable, and there is a great tendency for the pain to become generalized. It may spread upwards along the spine and give rise to occipital headache, or downwards, causing severe backache or coccygodynia. Extension forwards into the abdomen is common, and also downwards into the thigh. Neurotic persons may complain of widespread pains of great intensity, which cause great suffering.

Vesical irritability.—Increased frequency of micturition is a common symptom of movable kidney. It is more common among women, being only present in one or two of my male patients. Sometimes it is very distressing, preventing the patient from attending church or taking

part in social functions. The irritability is generally worse during the day, but in some cases it is present at night also. One lady stated that she had to get up eight or nine times in the night, so that her rest was seriously interfered with.

Occasionally a scalding sensation, or a sharp cutting pain, is experienced during micturition. This symptom occurs independently of bladder irritability.

The urine.—The possible changes that may occur in the quality and quantity of the urine in movable kidney have already been discussed. It is only necessary to repeat that intermittent albuminuria is often present and may lead to an erroneous diagnosis of Bright's disease. Renal casts are much more rarely found, and the albumin usually disappears when the patient is put to bed, or the kidney is efficiently supported by a belt. This occurs without any change in diet being made. Blood and blood-casts may be found after attacks of partial strangulation of the kidney. Newman regards the presence of blood-casts as almost pathognomonic of acute venous congestion from torsion of the renal pedicle. Pyuria may also occur, and be cured by fixation of the kidney.

Variations in the quantity and specific gravity of the urine are common, as we have seen. Sometimes small quantities of highly concentrated urine are excreted, while at others large quantities of very dilute urine are passed.

CHAPTER IX

SYMPTOMS: GENERAL

Abnormal renal mobility may be the causal factor of chronic ill-health, even when local symptoms are absent or comparatively insignificant. There is a lowering of mental and physical efficiency, and the clinical condition is a form of neurasthenia. The symptoms are mainly functional, but for some of them there is a physical basis which may, in part, furnish an explanation, although the actual manifestations of disturbance vary greatly in different individuals.

Apart from the physical condition of the kidneys, the occupation and temperament of the patient play an important part in determining the severity and character of the symptoms. A degree of displacement which would not seriously disturb a leisured woman who is able to rest as much as she wishes and who need not undertake work involving severe mental or physical strain, may cause complete breakdown in a school teacher, shop assistant, or professional nurse. Again, the effects of renal mobility are more marked in persons of the "temperamental" type with naturally unstable nervous systems.

When investigating the cause of chronic ill-health in particular individuals it is important to remember that many factors may play a part and that it is comparatively rarely that a particular lesion is wholly responsible. Even when the primary cause is discoverable its symptomatology is modified and often obscured by the presence of associated

and secondary lesions and the development of functional disturbances in areas remote from the original focus. What every surgeon knows to be true of intra-abdominal disease applies equally to renal mobility. It is not enough to ascertain that the kidneys are displaced: the possibility of other troubles must be borne in mind, and it is often difficult to assess the particular importance of the nephroptosis in a clinical syndrome characterized by marked and widespread functional disturbance or by symptoms mainly referred to regions other than the loin. Just as our greater knowledge of the living pathology of the abdomen has made diagnosis more difficult because of the discovery of the mimicry of the classical symptoms of one lesion by another at a distance and the frequent co-existence of two separate lesions, so displacement of the kidneys may cause symptoms suggesting some quite different cause and may be, and often is, associated with other lesions. The investigator, hunting for the explanation of ill-health, must be prepared for many false scents and possibly a plurality of causes.

Before proceeding to describe particular symptoms referred to various regions of the body, a short account of certain characteristic features which nearly all patients present will be given.

Fatigue.—This is a very constant complaint, and may almost be described as the predominant symptom of nephroptosis. Too much importance cannot be attached to it, because it gives the measure of the fall from the normal level of efficiency that the healthy individual should possess. Just as Sir James Mackenzie taught us that the true test of cardiac efficiency is its capacity to respond to strain, and its failure to do so is indicated by the patient being pulled up and compelled to rest, so the real test of the incapacity caused by renal mobility is its effect upon the working efficiency of the body as a whole. A person who complains of always feeling tired, or becoming exhausted by comparatively slight mental or physical effort, and who

shows by his physical condition that the complaint is a genuine one, is a sick person, and as such calls for careful investigation. A persistently fatigued brain and body is abnormal, and it is no diagnosis to label the condition neurasthenia and attribute it to "nerves." It is true that many causes, psychical and physical, may produce impaired efficiency, but the fatigue associated with nephroptosis is sufficiently characteristic to enable a differential diagnosis to be made with a considerable degree of accuracy.

It is quite usual for patients suffering from nephroptosis to state that they always feel tired, and wake up in the morning feeling so. A housewife will say that she cannot do her ordinary work without becoming utterly exhausted; a school-teacher, that she can only continue her work by going to bed very early and resting over the week-end; while women in more leisured circumstances give up dancing, tennis, and active exercise owing to the exhaustion that follows. There are no special features about the fatigue complained of; it is similar to that produced by prolonged strain combined with lack of sleep in normal persons. In normal health eight hours' rest is sufficient to maintain physiological balance and to allow of the elimination of the fatigue toxins which have accumulated in brain and muscles during sixteen hours' activity. In nephroptosis a much longer period of rest is needed to secure this balance, and in such cases sixteen hours' rest is necessary to eliminate the excess waste produced by eight hours' activity. The falling of the kidneys when the patient is in the erect position appears to slow down katabolic metabolism, with the result that the body soon becomes clogged with waste material, and feelings of fatigue are experienced.

A married woman, aged 42, stated that she was quite well until four or five years ago. Then she began to suffer from backache low down, which had got steadily worse. More recently the pain radiated into the abdomen and down the fronts of the thighs. She complained of feeling weak

and tired, and was unable to do her housework on account of exhaustion. She always felt drowsy, and could sleep at any time. There was no disturbance of micturition, and her digestion was good. Exertion aggravated all her symptoms, which were relieved by rest. She had lost some weight. She was a small, pale, tired-looking woman with a haggard expression. Her complexion was bad, and the skin dry and dusky. Teeth good. Chest sound. General nutrition poor. The lower abdomen was protuberant when standing up, and both kidneys were very loose and a little tender. At the operation the right kidney was of fair size and healthy, but surrounded by many adhesions; the left kidney was small and pale, and the renal pelvis was dilated. She made an excellent recovery, and her general condition greatly improved.

A man, aged 43, stated that he had never been very strong, and seventeen years before he had been rejected for life assurance on account of albuminuria, which had persisted. In spite of this he had built up a successful business which demanded great mental acuity. Physical exertion soon caused fatigue, and he was unable to go more than half way round a golf course. He had also had to give up hunting and shooting, of which he was very fond. He was greatly dissatisfied with his condition and his inability to engage in active pursuits owing to the exhaustion that followed. He was a tall thin man, muscular, and generally sound. When examined standing up, the left kidney could be felt wholly below the ribs and lying just outside the rectus muscle—it was a little tender. The right kidney could not be felt. At the operation, the left kidney was found to be very loose and surrounded by many adhesions, especially at the lower pole. The right kidney was also a little loose. Double nephropexy was performed. The operation was followed by marked improvement, and he resumed all his active pursuits without experiencing the old fatigue. Three years later he was accepted for

active service in the War and commanded a Yeomanry Squadron.

Loss of weight.—This is a very constant result of renal mobility. The loss of weight usually takes place slowly, but in the aggregate is considerable, and it is no unusual thing for the patient to state that she is two or three stones lighter than she was several years previously. As stated in an earlier chapter, weight loss and fat diminution are a sequence and not a cause of nephroptosis. Associated with loss of weight are other signs of disturbed nutrition. The skin is dry, harsh in texture, and often dusky with patches of discoloration. The complexion is sallow or muddy and the hair dry, with a tendency to fall out. The musculature is of poor quality, flabby and toneless. The pulse is generally lacking in volume and of low tension.

Depression.—This is a very constant symptom of nephroptosis, even in patients who present no other evidences of mental disturbance. To a certain extent it would appear to be due to the direct effect of the renal mobility upon the nervous system, which becomes exhausted by constantly repeated stimulation and fatigue toxæmia. The psychical effect of constant failure to meet the daily demands of household or business, and the failure to derive permanent benefit from the ordinary forms of treatment for neurasthenia, is also an important factor. Gradually repeated failure produces despondency and hopeless acceptance of a life of semi-invalidism. In the earlier stages, however, most patients actively resent their condition, and over and over again I have been told: "I am quite sure there is a cause for my symptoms, and if only it could be found and removed I should be all right." This active desire to get rid of the "something" that is weighing them down is very characteristic, and differentiates the depression from which they suffer from that of purely psychical origin.

A peculiar mental cloud appears to envelop many of

the victims of nephroptosis which has the effect of darkening their outlook ; they seem to view the outside world through clouded glasses. These have not the effect of creating illusions or delusions, but give an aspect of dreariness and drabness to the environment. A lady, upon whom I performed double nephropexy, informed me two years after the operation that the main benefit she experienced was not the improvement in her physical condition that had taken place, but that her entire outlook on life had changed and that she lived in another world altogether.

CHAPTER X

SYMPTOMS: DISTURBANCES OF DIGESTION AND SEXUAL FUNCTION

DISORDERS OF DIGESTION

A VERY large proportion of patients with nephroptosis complain of disturbed digestion, and displaced kidney should be included in the list of possible causes of " surgical dyspepsia." It may be the sole physical factor, or be associated with intra-abdominal lesions, particularly chronic appendicitis. The investigation of a case of chronic indigestion is incomplete unless renal mobility is sought for and, if found, its influence determined. More and more, increasing experience of abdominal surgery is forcing us to abandon the older and simpler teaching that such lesions as appendicitis, cholecystitis, gastric and duodenal ulcers, etc., are present as distinct entities, each with a distinctive symptomatology. The problem then was to label the lesion correctly and apply the appropriate treatment for it. We now know that the problem is much more complicated, and that the causes of abdominal disturbance must not be sought for in separate water-tight compartments but the whole field explored. Multiple lesions, associated as primary and secondary, or, perhaps, entirely unrelated may, and frequently do, exist. The field of exploration must include the loins, and the investigation cover the question of abnormal renal mobility. The percentage of cases with renal mobility is very much higher among the sufferers from persistent functional disorders of

digestion than it is among the healthy, or among sick people in general. This being so, it is important to ascertain whether the kidneys are movable when the symptoms do not improve with general and medical treatment. Still more important is it to do this before deciding upon any other surgical procedure for the relief of symptoms which are not directly associated with some obvious lesion in the stomach or bowel.

In the main, the disorders of digestion associated with movable kidney are functional, and are characterized by persistency rather than severity. They are, however, sufficiently pronounced to cause serious discomfort and greatly annoy the unfortunate sufferer. In some cases the symptoms are more severe, and may be associated with dilatation of the stomach, mucous colitis, and serious flesh-loss.

When abnormal renal mobility is the uncomplicated cause of digestive disturbance the characteristic feature is the close relationship between posture and symptoms. In ordinary indigestion a close relationship between the kind of food and the time at which it is taken and the symptoms can be established. Modifications of diet and medicinal treatment can be relied upon to give relief. In the dyspepsias caused by surgical intra-abdominal diseases such as appendicitis, cholecystitis, duodenal ulcer, etc., the characteristic feature is intermittency and the occurrence of " attacks " of disturbance. Although the kind of food and the times of meals have some bearing upon the symptoms this relationship is not constant, and the erratic nature of the latter is the outstanding feature. The patient is unable to explain them satisfactorily by anything he does or eats. When nephroptosis is the cause the patient learns that exertion and strain bring on the disturbance and rest relieves it.

Duodenal stasis.—It has long been known that some dilatation of the stomach in association with movable right

kidney is not uncommon, and in a few recorded cases the dilatation has been extreme. Herbert Bramwell (*Brit. Med. Journ.* 1901, part ii., p. 1135) reported a case in which death resulted. At the autopsy it was found that the movable right kidney, in its descent, dragged upon the peritoneal covering of the pylorus and occluded the outlet of the stomach. Some years ago I performed an autopsy upon a man in whom there was no other explanation for a greatly dilated stomach except a mobile right kidney which obstructed the duodenum when drawn downwards.

In recent years, further light has been thrown upon the condition by X-ray examination after a barium meal. It is not at all unusual in nephroptosis to find a moderate degree of stomach stasis, one-sixth to one-fourth of the meal remaining in the stomach at the end of four hours. The first stage of the duodenum is seen to be abnormally capacious. The obstruction occurs at the upper part of the second stage and is apparently due to the tightening of the peritoneum crossing the duodenum in this situation by the drag of the dropped kidney. The duodenum is either kinked or compressed and its lumen obstructed. The stasis is limited to the first stage of the duodenum and differs from that described by Professor Wilkie which results from obstruction in the third stage where the duodenum is crossed by the superior mesenteric vessels. It is only when descent of the kidney is associated with enteroptosis that the obstruction is seen in the third stage. The obstruction caused by the mobile kidney is a postural one and is relieved by lying down or the wearing of a suitable kidney support.

The epigastric distress, flatulence, and impaired appetite that are such common symptoms in nephroptosis probably depend upon the duodenal stasis induced as described above, but the irritation of the splanchnic plexus set up by the mobile kidney may also play a part. Very striking is the hypochondriasis and weight loss which these patients suffer

from. It is this association of digestive disturbance with more or less general neurasthenia that has led surgeons, in the absence of any gross local cause, to regard the victims as outside the scope of surgery. They are regarded as neurotics and allowed to become confirmed invalids. Medicine and modifications of diet give no permanent relief: long holidays and sea voyages do not benefit: they are the despair of the psychotherapist. Rest alone, by removing the drag of the loose kidney, gives real relief.

Chronic appendicitis.—The association of appendical disease with prolapse of the right kidney is very common. So frequently is this the case that I invariably remove the appendix when operating for loose right kidney. Almost always it is possible to do this through the loin incision, the only exceptions being those cases where the appendix is situated low down and firmly held by adhesions. I was led to adopt this course by the frequency with which patients upon whom I had performed nephropexy subsequently developed symptoms of appendicitis, and in some instances in very acute form. There had been nothing in the history nor on physical examination to suggest disease of the appendix at the time of operation. I have also seen a number of cases where the appendix had been removed and a very loose right kidney left untreated, with the result that many of the symptoms had persisted.

The frequency with which chronic appendicitis exists in association with right-sided nephroptosis is probably explained by irritation of the colon and sagging of the cæcum. The ascending colon is dragged upon by the falling kidney and its supports are loosened, while the cæcum assumes a lower level and is often found in the true pelvis. These factors make for catarrh of cæcum and colon and stagnation of fæces, conditions which are very liable to cause appendicitis. The association of the two conditions complicates symptomatology and makes a differential diagnosis difficult, if not impossible. The only safe course is to remove the

appendix when operating for movable kidney, and to examine for renal mobility before operating for chronic appendicitis. The knowledge that the appendix is probably

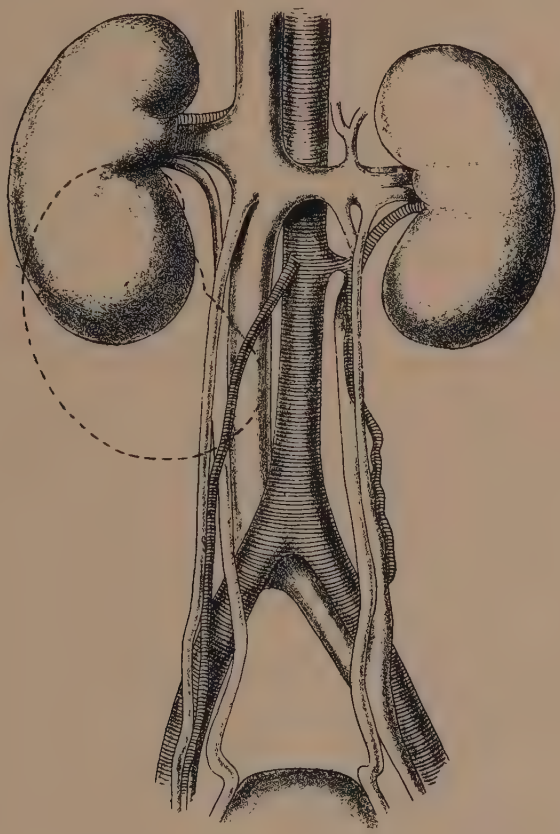

Fig. 6.—Diagram to show effect of prolapse of right kidney upon the ovarian vein and inferior vena cava. (*Goelet.*)

unhealthy is a reason for not advising the prolonged use of kidney supports with hard pads.

Colitis.—Large bowel disturbances are common symptoms of nephroptosis. These are of milder character than those of primary colon diseases, but may cause much

distress. Flatulent distension, fæcal stagnation, constipation and diarrhœa, and irregular spasmodic contractions giving rise to discomfort and colicky pain may all be met with. The stools may contain mucus at times, but definite mucous or ulcerative colitis is rare. The cæcum is usually prolapsed and the flexures are at a lower level than normal when the patient is upright. Owing to the loosening of the fixed supports of the colon sharp angulations are not often met with, but thin, sheet-like adhesions at the hepatic flexure are common. These may extend much lower than those described by Lane and involve the whole length of the ascending colon.

DISORDERS OF THE SEXUAL ORGANS

Female sexual disorders.—Professor Goelet, of New York, one of the first to draw attention to renal mobility and its treatment, was greatly impressed by the effect of nephroptosis upon the female sexual organs. He considered it to be a common cause of pelvic disease. In a paper read before the New York State Medical Association in October, 1904, he stated that the kidney, when prolapsed, directly compresses the ovarian vein and impedes venous return from the pelvic organs. The obstruction of the vein may be caused by the lower pole, which swings inwards as the kidney descends; or by the drag of the bent ureter behind the vein (*see* Fig. 6).

Goelet advanced three reasons for his assertion that movable kidney is a potent cause of pelvic disturbance:

1. The association of pelvic disease with renal mobility is too common to be explained as a mere coincidence.

2. The explanation that the conditions are related as cause and effect is a rational one.

3. Pelvic disorders have been repeatedly cured by nephropexy.

Goelet had himself operated upon 197 patients for movable kidney, in a large proportion of whom symptoms referable

to the pelvic organs were present. His results were highly gratifying.

Goelet stated that the following symptoms may be caused by movable kidney, and cured by nephropexy :—

1. Dysmenorrhœa.
2. Profuse leucorrhœa.
3. Endometritis.
4. Ovaritis, etc.
5. Menorrhagia and metrorrhagia.

Suckling states that his personal experience is in agreement with the teaching of Goelet. A very large proportion of the women in whom he found mobility of the kidney suffered from gynæcological complications, together with vesical irritability. The symptoms were completely relieved by supporting or fixing the kidney. Several of his cases suffered from sexual delusions.

It is not difficult to understand, in view of the anatomical connexion between the nerves and veins of the kidneys and those of the ovaries and uterus, that gross displacement of the former organs would cause symptoms referable to the latter. The ovarian or spermatic plexus of nerves commences in the renal plexus and accompanies the branches of the ovarian artery to the ovary and uterus. The uterine venous plexus pours its blood in greatest part into the ovarian veins (Quain). Hence it follows that obstruction of the ovarian vein would produce congestion of the uterus and predispose to menorrhagia and metrorrhagia.

My personal experience, though less extensive than Goelet's, proves that serious gynæcological symptoms may be caused by movable kidney. Ovarian pain and tenderness, severe "floodings," intractable endometritis and dysmenorrhœa have been encountered. In some instances gynæcological operations had previously been performed without resulting benefit. One or both ovaries had been removed in several instances, and in one case—a young married woman—the uterus had been removed. Many of

my cases had been curetted on one or more occasions, with only very temporary benefit. The importance of taking nephroptosis into account when investigating cases suffering from pelvic symptoms for which no adequate local cause can be found cannot be over-emphasized.

The following cases are illustrative of the gynæcological disorders that may be associated with movable kidney :—

Case i. Amenorrhœa.—A married woman, aged 30, had not menstruated for six months. She was very emaciated, looked haggard and prematurely old, and suffered from delusions. The right kidney was in the iliac fossa and bound down by dense adhesions. Nephropexy was performed, with immediately good results. Menstruation recommenced and she improved mentally and physically.

Case ii. Amenorrhœa.—A married woman, aged 28, was sent to me in October, 1907, by Dr. Duncan, of Hockley. She was suffering from profound neurasthenia, and complained of flesh-loss, dragging pains in the abdomen when standing, depression, and inability to do her housework. Latterly she had been confined to bed. Medicinal treatment failed to relieve. For many months she had ceased to menstruate.

The right kidney, which was very movable, was fixed. The operation was followed by profuse uterine hæmorrhage, which lasted ten days.

Fifteen months later Dr. Duncan reported that the patient was better in every way, had gained two stones in weight, was able to do her housework, and was menstruating regularly.

Case iii. Irregular menstruation and leucorrhœa.—An actress, aged 23, was seen in March, 1908. For three years she had suffered from headaches and backaches, constant lassitude, and digestive disturbance. Menstruation was irregular and painful, and she complained of copious leucorrhœa. The uterus had been curetted, with very

slight benefit. A prolonged holiday and sea voyage to South Africa made her worse rather than better.

Both kidneys, which were very loose, were fixed. The patient returned to the stage, and in October, 1909, reported herself as being "perfectly well."

Case iv. Dysmenorrhœa.—A married woman, aged 35, was sent to me by Dr. Wigginton. She complained of great pain at the menstrual periods, which necessitated her lying in bed. The periods occurred at irregular intervals and the flow was scanty. There was increased frequency of micturition. For some time she had worn a pessary, but obtained very little relief. The patient was tall, thin and haggard-looking. She complained of dragging pain in each loin, and of pains radiating into the groins. Both ovaries were very tender. The uterus was normally placed and freely movable. Both kidneys were very movable.

Double nephropexy was followed by much improvement.

Case v. Endometritis.—A married lady, aged 33, was seen in consultation with Dr. Rennie. She had been ill for two years with symptoms of neurasthenia, which reduced her to a state of chronic invalidism. No treatment availed, and she went steadily downhill. Eight months before I saw her a gynæcological surgeon had removed her uterus for "endometritis associated with a small fibroid." After the operation she was worse than before. She complained of constant abdominal discomfort, loss of appetite, nausea and pain after food, and dragging pain in the right side. The bowels were relaxed, and the stools contained mucus. Vesical irritability and palpitation were prominent troubles. The patient was very emaciated, weighing only 82½ lb. She was depressed, irritable, and always tired. Her pulse-rate, even when in bed, was over 100. Both kidneys were movable, the right falling into the iliac fossa when she stood up, and the left dropping completely below the ribs. The right kidney was also tender.

Double nephropexy was followed by marked improvement.

These cases indicate the importance of movable kidney as a factor in pelvic disorder. It is characteristic that the pelvic symptoms are associated with others relating to the nervous system. The general condition of the patient is worse than one would expect if it were the result merely of the pelvic disorder. It is sometimes very difficult to say whether the patient's illness is caused by pelvic disease, or the pelvic symptoms are the result of her illness. When, however, physical examination of the pelvis reveals no satisfactory explanation of the local symptoms, and still less of the general symptoms, it is very important to look for an outside cause before subjecting the patient to such mutilating procedures as removal of the ovaries or of the uterus. Movable kidney is a real and common outside cause, and as such should be examined for and, if found, treated.

MALE SEXUAL DISORDERS

Aching pain in the testicles, frequent nocturnal emissions, and delusions relating to the sexual organs may be caused by movable kidney. In men, as in women, such symptoms are associated with others connected with the nervous system and digestive system, and the main reason for attributing them to the renal mobility is that they disappear after cure of the latter.

CHAPTER XI

SYMPTOMS: DISORDERS OF THE NERVOUS SYSTEM

That renal mobility is very frequently associated with functional disorders of the nervous system is generally admitted. Widely differing interpretations of this association have been given, and there has been, and still is, much controversy as to its significance. Many assert that the association of the two conditions is largely accidental and that there is rarely any direct relationship between them. If this is true, then it logically follows that mobility of the kidneys is of little or no importance and calls for no treatment. Others admit that movable kidney may, and often does, produce functional nerve trouble of varying degrees of severity, but advise great caution in its treatment, especially by operation. The logic of this position is not obvious. Finally, other observers assert that there is a real and direct relationship, of the nature of cause and effect, between movable kidney and neurasthenia, etc. If this is so, it is logical to remove the cause by fixing the kidneys. Otherwise, symptoms alone will be treated and their cause ignored.

Functional disturbances of the nervous system provide one of the most difficult and puzzling problems in medicine. They are characterized by a symptomatology so wide and varied that it may relate to any and every mental and physical function. Not only are the symptoms so widespread and variable, but they are often of a misleading character in that they suggest local causes which actually

do not exist, and obscure physical lesions which are largely responsible for them. It is recognized that the condition may result from many different causes operating singly or several together. Amongst these may be mentioned toxæmias of microbic, metabolic or extraneous origin; persistent overstrain of mind or body; unsatisfactory environment and unsuitable food; deficiency or excess of ductless-gland secretions; deranged psychical processes; and chronic physical disease. It is upon a correct assessment of the underlying causes that successful treatment depends, and the principal reason why these cases are so difficult to treat is that the cause is often so obscure.

It is recognized that a perfect tree of neurosis may have a definite organic root of origin; and although the latter may be obscured by a mass of symptoms not directly related to it, its discovery and removal is essential for successful treatment. The explanation appears to be that symptoms which are at first local subsequently overflow and become generalized. This is particularly liable to occur in people with a naturally unstable nervous system. The cumulative effect of repercussion of stimulus may be enormous although the actual stimulus itself may be comparatively trifling.

NEURASTHENIA

A very large proportion of the cases of movable kidney that come under the notice of the medical practitioner suffer more or less severely from symptoms of neurasthenia. The principal complaints are constant "tiredness," severe headaches, backache, loss of mental and physical energy, and despondency.

The greater the necessity for work the more pronounced the symptoms. Thus schoolmistresses, shop assistants, and business men suffer more severely than leisured housewives. Compulsory and prolonged strain produces complete mental and physical prostration. Loss of power of concen-

tration, failing memory, visual defects, and serious wasting are common symptoms. Every mental and physical action is performed with greater difficulty than usual, and is followed by an abnormal degree of exhaustion. Even the writing of a simple letter may require great effort, and molehills assume the proportions of mountains. Many patients complain of a feeling of mental perturbation best expressed by the term " moithered " : the thoughts cannot be collected, and trifling distractions or the necessity for deciding quickly upon a course of action produce mental flurry and chaos.

The unfortunate sufferers are painfully conscious of their inefficiency in comparison with other people. They are subject to fits of black depression, are irritable, restless, and hypochondriacal, a nuisance to themselves and all around. In many cases there is an intense desire to get well, and a feeling that if only the cause of their troubles could be found and removed that result would follow. Very characteristic is a desire to do as much as possible. This causes aggravation of symptoms and ends in complete breakdown.

Most practitioners have one or more patients of this kind under their care. They are comparatively young, organically sound, and of good stock. They remain in a state of invalidism for years, and this in spite of treatment and an active desire to get well. Of them, Weir Mitchell may well say : " Why such people should be so hard to cure I cannot say, but the sad fact remains. Iron, acids, travel have for a certain proportion of them no value, or little value, and they remain for years feeble and for ever tired." All exertion exhausts, and rest alone brings improvement. Medicines are almost useless, and travel, particularly sea voyages, often does harm. So-called " rest cures " improve at the time, but relapse quickly follows a return to ordinary life.

In people of neuropathic stock, more serious symptoms

may arise. Delusions, suicidal impulses, and melancholia are of common occurrence, many cases ultimately passing into asylums.

Illustrative cases.—i. A married woman, aged 43, complained that for six years she had had pain in the right side. The pain extended into her leg and "seemed to take the use out of it." She stated that she always felt tired, even in the morning. All exertion made her worse: she did her housework with great difficulty, and could only walk a short distance without becoming completely exhausted. Her digestion was bad, and her appetite poor. At times she was very depressed. All treatment had failed to give any permanent benefit. The patient was very emaciated and flabby, and looked older than her years. Her expression was drawn and haggard. The right kidney fell into the iliac fossa when she stood up, and the left wholly below the ribs.

Double nephropexy was performed. Six months later the patient was a different woman altogether, being happy and contented. She looked much younger, and had gained flesh considerably. "Our home is a different place altogether" was the husband's description of the change that had taken place.

ii. A single lady, aged 37, complained that for some time she had felt unable to do her work as a schoolmistress. She suffered from "indigestion" and general lassitude, was always tired, was irritable and worried, and lately had lost weight. Medicines and travel had proved useless, rest alone bringing relief.

Both kidneys, which were very movable, were fixed. The right kidney was adherent to the colon. A year later she wrote saying that she was a "new woman." The dyspeptic symptoms had all disappeared, she had gained in weight, and enjoyed her work.

iii. A gentleman, the headmaster of a large school, was invalided home from South Africa on account of ill-health.

For some time he had been nervous and depressed, and had suffered severely from headaches. He felt that unless his health improved he would be compelled to relinquish his profession, the worries and anxieties of his responsible position almost driving him to distraction. He was unable to take part in games, and by night was in a state bordering on collapse. He stated that his life was a misery to him and that he took no pleasure in anything. The voyage home and a subsequent holiday did him no good. Numerous physicians had been consulted without result.

In November, 1906, the right kidney was operated upon by Mr. Jordan Lloyd, at Dr. Suckling's request. The left was known to be slightly loose, but was not interfered with. After the operation the patient slowly improved. He resumed his work in South Africa and found that he had lost many of his old troubles, was able to take part in active games, and could perform his duties easily. He stated, however, that he still did not enjoy life, and was not satisfied with the state of his nervous system. Knowing that his left kidney was movable, he returned to England in March, 1908, for the purpose of having it fixed.

He came under my care in April. He was a muscular, spare man, anxious about himself and rather hypochondriacal. The right kidney was securely in place, and could not be felt. The left kidney was found far forwards behind the stomach, with its lower pole rotated inwards. It was only about 1 inch below the normal level. The capsule was thick and mottled, and there were dense adhesions to the lower half. The kidney was freed from all adhesions and fixed in its normal position.

Writing a year later, he stated that his health was better in many ways, and "symptoms that I have had for at least twenty-five years are vanishing one by one." He still complained of trouble in the temples.

An interesting point in this case was the fact that at no time was any pain experienced in the back or sides.

iv. A married lady, aged 45, complained that she had not been well since her last confinement, twelve years ago. Since then she had had an almost yearly nervous breakdown. She became steadily worse, and in the last breakdown lost her memory and became extremely depressed. She suffered from constant tiredness, morbid introspection, pains in the head and back, giddiness, great flatulency, and constipation. For several years she had been averse to all forms of active exercise and social excitement, though naturally she was a cheerful, active, and sociable woman. The Weir Mitchell treatment had been tried and failed. Recently she had undergone an eight weeks' " rest " course, during which she gained a stone in weight, but without improvement in respect of symptoms. The patient was a stout, very flabby woman, easily excited, and subject to fits of depression. Both kidneys were very movable, and the urine contained a haze of albumin.

Double nephropexy was performed. Writing six months after the operation, she stated that she had gained a stone and a half in weight. The following extracts from her letter speak for themselves : " After the first three months I have never felt ache or pain, and I have never had need of a doctor since my return home. I have been away from home for six weeks and had a thoroughly good time with nothing of the invalid about me. I have never felt better in my life than now."

v. A married lady, aged 29, stated that she was strong and well until five years ago. Her illness began with a nervous breakdown following upon the death of her baby when eleven weeks old. She was never well afterwards. Two years ago she underwent a " rest cure," and for a time was better. She was very well during her last pregnancy, which terminated in the birth of a healthy child nine months ago. Since this last confinement she had been much worse. During the last six months she had lost three stones in weight. She complained of always feeling tired, of

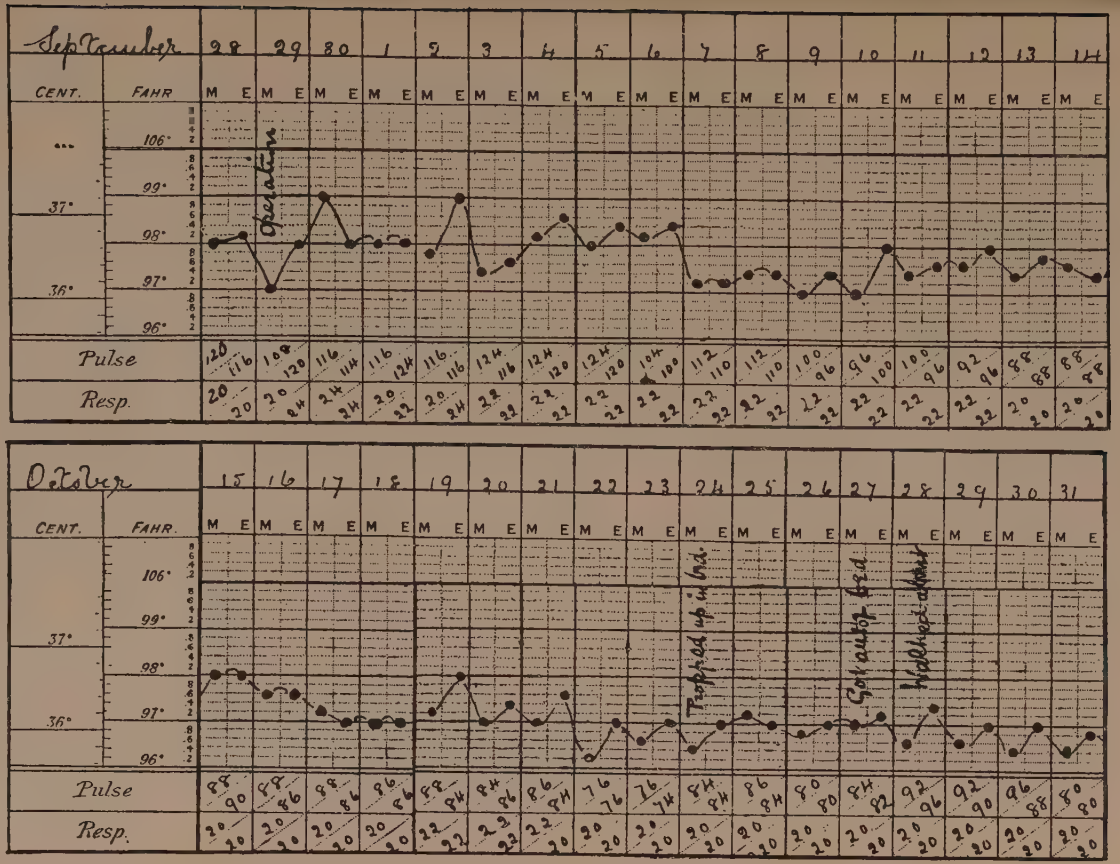

Chart illustrating the effect of nephropexy upon the pulse-rate.

constant headache, of flatulency, and of obstinate constipation. She could only walk a very short distance, and was unable to look after her children or discharge the usual duties of a housewife. All exertion brought on abdominal pain. Medicines had proved useless, and rest alone gave relief.

The patient was a bright, talkative woman, presenting typical symptoms of spinal neurasthenia. The right kidney was very movable, and the left mobile to a less degree. All her other organs appeared healthy.

Double nephropexy was performed, with rapid and permanent improvement in her condition.

vi. A trained nurse, aged 32, was well until two years and a half ago. Her illness began with a feeling of nausea on getting up in the morning. She never vomited. Then she felt a pain in the left side and epigastrium, and more lately in the right side also. The pain was always made worse by exertion and relieved by rest. She broke down many times, having to retire from several cases in succession. For two years she had been compelled to give up nursing altogether. In addition to dragging pain in the back, sides, and abdomen, she complained of always feeling tired and languid, of inability to undertake any physical exertion without becoming completely exhausted, and of being very depressed. She suffered from flatulence and constipation, from vesical irritability and painful micturition, and from distressing skin eruptions. The menses were delayed and painful, and there was considerable wasting.

The patient was a woman of powerful physique, but looked thin, haggard and prematurely aged. The skin was harsh, dry and blotchy. Both kidneys were extremely movable, falling into the iliac fossæ when she stood up; to both the term "floating" might justly be applied. Double nephropexy was performed. Since the operation she has steadily improved, and at the end of three years expresses herself as being practically well.

vii. A married lady, aged 40, had been in good health

until five years ago. Then, after her last confinement, followed by the early death of the baby, she began to go downhill. Three years ago she completely broke down, "all the use going out of my body." Since then she had spent the greater part of her time in bed. She complained of being always tired and languid, of persistent frontal headaches, and of attacks of depression. She could only walk a very short distance, and was averse to society and excitement of all kinds. For three years the patient had been under continuous medical treatment, twelve specialists had been consulted, and she had undergone the Weir Mitchell treatment, a "rest cure," and special hydropathic treatments. Two operations had been performed upon her nose for the relief of the headache, and she had tried all kinds of spectacles. In spite of all this the headaches were as bad as ever and her general condition became worse.

The patient was a typical example of chronic neurasthenia. She was depressed, flabby and toneless. No organic disease existed. Both kidneys were movable, falling several inches in the erect position.

Double nephropexy was followed by rapid improvement. In two or three weeks she began to eat heartily, enjoying her food, and suffering no discomfort afterwards. In a month the headache only occurred at intervals of several days, in six weeks she was able to drive for hours together, and in less than three months she took part in a large civic entertainment.

These cases have been selected at random from my note-book as examples of the type of neurasthenia associated with renal mobility. I have notes of many hundreds of cases that have been under my care with very similar symptoms. That the symptoms were in the main caused, or aggravated, by mobility of the kidneys is proved by the beneficial results of nephropexy. The improvement often takes place slowly, but it is practically always permanent. This is in striking contrast to the effect produced by other forms of treatment.

HEADACHE

Dr. Suckling has directed attention to the fact that severe and persistent headache may be caused by movable kidney, and he records several striking instances of permanent cure by nephropexy. Headache is a very common symptom in cases of neurasthenia with renal mobility, and in some instances may be the chief cause of complaint. That it is not due to constipation and digestive disturbance alone is proved by the fact that the ordinary treatment for these conditions does not relieve the headache. Rest, and rest alone, relieves, unless measures are taken to support the kidneys. Sometimes typical migraine is met with.

A seamstress, aged 35, suffered for many years with intense frontal headache. The headache came on nearly every day, and lasted many hours. She was depressed, and stated that the pain in her head almost drove her out of her mind. In November, 1906, the right kidney, which was very movable, was operated upon by another surgeon. The six months immediately following the operation were the best in her life. The headaches practically ceased, she gained one and a half stones in weight, and the periodical attacks of vomiting, from which she suffered prior to the operation, entirely stopped.

The patient came under my care in January, 1908. She was still much better than before the operation, but complained that the headaches were returning, and she was anxious to know whether the kidney had remained in place. The right kidney was firmly fixed, but the left was movable. Left-sided nephropexy was performed. Writing a year later she stated that she had remained free from all headache, and felt an entirely new woman.

A lady, aged 22, had suffered for several years with severe headaches. They occurred at frequent intervals and completely prostrated her. Both kidneys were movable.

In the spring of 1907, at Dr. Suckling's request, I fixed the right kidney. She was better afterwards, but the headaches, though less severe, persisted. At Christmas, 1908, the left kidney was fixed. Since then she has been practically free from headaches, and has been in better health generally.

TACHYCARDIA

A number of my patients complained of severe palpitation induced by the least excitement or physical exertion. This symptom causes great distress. Increase in the pulse-rate is also common, and in several instances the average rate was over 100. In one case, a report of which is given, the pulse-rate at one time was 170, and remained at 120 after eleven weeks' rigid confinement to bed.

Illustrative case.—A schoolmistress, 34 years old, was seen in consultation with Dr. Walter Hues, in September, 1909. She had been in good health until two years ago, when, after a bad attack of hay fever, symptoms of neurasthenia developed. Nine months later she had influenza, after which her symptoms increased in severity. Finally, after a second attack of influenza in March, 1909, she became very ill. She suffered from great lassitude, attacks of palpitation, nervous excitement, and flatulent dyspepsia, and lost weight rapidly. In June, 1909, she broke down completely, and had to take to her bed, where she remained for three months. During this time, in spite of complete rest and medicinal treatment, the average pulse-rate was 120, but at times it rose to 170. She was especially upset at her menstrual periods.

The patient was extremely wasted. Her skin was dry and harsh and in places disfigured by blotches. She looked haggard and at least ten years older than she was. The pulse was small and soft and there were 120 beats per minute. The abdomen was flaccid, and distended coils of bowel were visible. The stomach was moderately dilated.

The right kidney was very freely movable, but not tender ; the left kidney was not palpable.

Right-sided nephropexy was performed on September 29th, 1909. The kidney was very pale, its capsule was thick, and there were dense perirenal adhesions.

Convalescence was complicated by a bad attack of ulcerative stomatitis which lasted a week and made it difficult for her to take food. The pulse steadily fell until it reached 76 at the end of three weeks. A menstrual period was passed through without any increase in the pulse-rate. A temporary increase occurred when she began to get up and walk about, but the rate never reached 100. The accompanying chart shows the effect of the operation upon the pulse. The general condition of the patient improved very much. The skin became soft and moist, and the blotches disappeared. Her appetite improved, and her face lost the drawn, haggard, prematurely aged look which had been so noticeable. She also began rapidly to gain weight. This improvement has been maintained.

RAYNAUD'S DISEASE

Dr. G. A. Gibson, of Edinburgh, published an account of two cases of Raynaud's disease that completely recovered after nephropexy. Previous treatment had entirely failed to relieve the symptoms. In a personal letter to the author, Dr. Gibson stated that he had had several other patients in whom Raynaud's disease was associated with renal mobility, and who were cured by fixation of the kidneys. Dr. Byrom Bramwell had similar experiences. Dr. Gibson considered that in some cases Raynaud's disease is due to reflex irritation of the vaso-motor system by a movable kidney.

DISORDERS OF THE MIND

More and more it is being realized that patients suffering from mental derangement should not be regarded as a class apart on that account. The difficulties created by the

character of the symptoms has led to such patients being segregated in special institutions where until comparatively recently control rather than investigation and treatment was the predominant note. This attitude to mental disorders has been unfortunate and has led to attempts to establish artificial distinctions between sanity and insanity which are based rather upon social than upon medical considerations. A truer note was struck by Dr. Flashman in one of the "Reports from the Pathological Laboratory of the Lunacy Department, New South Wales" when he stated: "We must look upon insanity as a disease whose symptoms are expressed chiefly through the nervous system but whose primary cause may reside in any one of the tissues or organs of the body." It is also becoming increasingly recognized that long before the final breakdown there are indications of disturbance, and that early recognition and appropriate treatment of these are all-important. As previously discussed, there is ample evidence to show that persistent irritation produces changes of a pathological character in the nervous system which are not confined to the centres immediately concerned but which extend to other centres, with resulting widespread disturbance of both mental and physical function.

Further, the repeated introduction of poisons such as alcohol, lead, morphia, etc., into the body is well known to produce such changes in the brain that insanity may, and frequently does, develop. The blood toxæmia in suppressed gout may induce insanity, necessitating detention in an asylum, mental equilibrium being subsequently regained when the gout assumes an active form (Savage). Evidence in favour of insanity being excited by the presence in the blood of toxins resulting from abnormal metabolism or defective excretion is rapidly accumulating. Urquhart concludes his Morison Lectures (*Lancet*, 1907) with the pregnant sentence: "The toxic theory of insanity demands our most serious attention and excites our liveliest hopes."

Accepting the toxic theory of insanity—and in view of the mass of evidence supporting it there is little justification for not doing so—the kidneys would be among the first organs to which the investigator would direct attention. They form the main channel for the excretion of waste products of all kinds. Impairment of renal function means blockage of the main sewer of the body. This must interfere with the processes of katabolic metabolism and bring about an accumulation of normal waste products or the formation of abnormal materials. That this is so, and that toxic substances accumulate or are formed, is certain. In nephritis slow poisoning occurs, and the various tissues of the body all suffer more or less severely. The toxins appear to have a selective action, affecting some tissues more than others. Further, it seems highly probable that different toxins are formed in different cases. Hence the symptoms of renal insufficiency vary considerably. In all cases, however, the nervous system is profoundly affected, though by no means always in the same way. Sometimes the symptoms are those of irritation—e.g. restlessness, irritability, epileptiform seizures and mania. In other cases they are those of narcosis—e.g. drowsiness, mental torpor, headaches and coma. Depression, delusional insanity, and melancholia are not infrequent manifestations of uræmia.

The association of movable kidney with mental disturbances similar in kind to those described as occurring in uræmia is frequent. The mental disorders described by Suckling as being especially associated with renal mobility are :

Loss of memory.	Suicidal tendencies.
Mental confusion.	Homicidal impulses.
Mental depression.	Morbid fears.
Melancholia.	Emotional disturbances.

A study of the etiology of mental disease is surrounded by many difficulties, and it becomes almost impossible to assign to any particular factor an exact causal value. So

many physical and psychical processes are involved in the maintenance of a normal equilibrium, and the passage from sanity to insanity occurs so insidiously and is the outcome of so many combined influences, that it is almost impossible to call any one " the cause " of insanity in a particular case. The mind is influenced to a very large extent by heredity and environment, and what in one person is sufficient to upset its equilibrium will in another person scarcely affect it at all. When, therefore, a particular process or event is spoken of as a cause of insanity, what is really meant is that in certain circumstances—i.e. in persons whose nervous system is unstable as a result of inherited or acquired weakness—it is sufficient to upset the balance and be the exciting cause of insanity. In this sense it may fairly be claimed that movable kidney is a cause of insanity.

Movable kidney acts deleteriously upon the nervous system in several ways. Thus :

1. The sympathetic nerves are irritated by the mechanical drag of the kidney. This in itself is sufficient to give rise to serious trouble, and may possibly be the direct cause of mental disorder in persons with neuropathic tendency.

2. By direct interference with the functions of the stomach and colon digestion is disturbed. The consequence of this is defective nutrition, from which the nervous system suffers in common with the rest of the body. The irritation of the pelvic organs caused by a mobile kidney also acts adversely upon the nervous system, tending to make it more irritable and less stable.

3. Pathological mobility of the kidney causes more or less interference with its function. This means interference with the normal excretion of waste materials and an accumulation of the products of katabolic metabolism within the body. The exact nature of these materials is unknown, but evidence goes to show that they are

toxic, and that the nervous system is profoundly affected by them. In other words, movable kidney tends to produce chronic toxæmia analogous to that caused by nephritis.

In any particular case a movable kidney may exert a deleterious influence in either of the above directions, or in all three combined. Whether this is in itself sufficient to cause insanity in a person with a sound nervous system may be open to doubt, but there is strong reason to believe that it may turn the balance when there is inherited taint or mental instability from any other cause.

The mental symptoms especially associated with movable kidney generally develop gradually, and are preceded by a period during which the patient suffers from " funny feelings in the head," lapses of memory, irritability to external stimuli, hysterical outbreaks, hypochondriasis, attacks of black depression, suicidal impulses, or loss of the power of concentration. During this time the general health fails and loss of weight is common. Active symptoms of insanity may occur at any time. Thus acute mania may develop, or the patient may become actively suicidal or homicidal. More usually, however, the progress is gradual. Delusions, often of persecution, develop. The attacks of despondency become more frequent and more severe, and during them suicide may be attempted. Several of my patients had attempted suicide on more than one occasion. Finally the border line is passed, and the patient becomes definitely insane. Melancholia is the more common form of insanity, but subacute mania is not rare.

Aufrecht reports the case of a man whom he had under observation for nearly fifteen years. His illness began with stomach troubles which resisted treatment. Both kidneys were known to be movable. Gradually the man became hypochondriacal, and his general health deteriorated to such an extent that a diagnosis of cancer of the stomach was made by his medical attendant. Eleven years after the

onset of symptoms maniacal delirium set in, and continued for three years without intermission. This was followed by dementia and death.

This case is of especial interest because Aufrecht states that he associated the symptoms with the renal mobility, but, unaware of Suckling's work, did not actively treat it. Since then he has obtained excellent results in similar cases by the use of a belt.

The number of cases of insanity that have been operated upon for movable kidney is as yet too small to justify definite conclusions from the results. The results are, however, most satisfactory, and a high percentage of "cures" has been reported. Suckling has published details of twenty-one cases of insanity that were cured by nephropexy. Some of these were personally known to me. Barling records four cases absolutely cured by him in this way (*Brit. Med. Journ.* April, 1908). Six cures were recorded by me in 1908, and since then several others have been added to the list.

Everyone is agreed that in the treatment of the insane careful attention must be directed to the general health, and adverse influences, so far as possible, removed. In particular must the continued action of the apparent cause of the final breakdown be prevented. Movable kidney, which undoubtedly interferes with the general health, and may be the determining cause of nervous breakdown, should also be sought for and treated. Fixation by operation is the only effective treatment. The strict supervision in asylums, although effective in removing many causes of mental breakdown, cannot rectify mechanical displacements.

Though nephropexy often succeeds in restoring mental equilibrium, it is far better not to wait until symptoms of insanity appear before operating. Prevention is better than cure, and progressive neurasthenia, depression, etc., occurring without apparent cause and resisting ordinary treatment, should be the indication for an examination of

the kidneys, mobility of which, if found, should be at once rectified.

I have performed nephropexy upon a considerable number of insane patients and the results have been distinctly encouraging. These cases are, however, very difficult to manage, and involve great anxiety both immediately after operation and for many months afterwards. Recovery usually takes place slowly, and relapse in the early stages must be allowed for. A particular source of anxiety is the tendency for sudden suicidal impulse to develop when recovery seems to have been established. It is my opinion that where definite insanity exists at the time of operation, surgical convalescence should be followed by residence in a mental institution for at least six months. A very satisfactory feature of my experience has been the permanency of results when once the dangerous period has been passed.

It is difficult to write the word "cure" over any case of insanity, and it must be remembered that in these cases insanity is the result of the baneful action of a movable kidney upon an already unstable nervous system. From my own experience, however, I am convinced that in certain circumstances renal mobility does act as a definite cause of insanity and that mental equilibrium is restored by nephropexy. A particularly satisfactory feature has been that in practically every case marked improvement in the patient's general health has followed the operation.

In the *Therapeutische Monatshefte* for September, 1907, Aufrecht writes: "According to Suckling's statement and my own opinion, after carefully investigated proof of the connexion between insanity and nephroptosis, there is a further addition to therapeutic resources—namely, nephropexy."

This chapter cannot better close than with that quotation, since it sums up admirably my views upon the subject.

CHAPTER XII

TREATMENT OF MOVABLE KIDNEY

Our knowledge of living pathology has been enormously increased by investigations made possible by X-rays, biochemistry, experimental endocrinology and bacteriology. To this must be added the information obtained by direct inspection of disease in the course of surgical operations and the effect of such operations upon function. More and more we are learning that the effects of disease rarely remain localized for long in the organ first affected. The disease itself may spread and set up secondary lesions, and even when this does not occur disturbance of function over an increasingly wide area develops. This makes the problems connected with successful treatment more difficult and complicated. It is not sufficient to detect a single organic abnormality: the possibility of associated lesions must be considered and all available evidence carefully weighed in order to estimate correctly the part it plays in disturbing function. Scientific medicine condemns the treatment of symptoms only: equally the hasty assumption that a particular lesion of itself explains the symptoms is to be deprecated.

In abdominal surgery this is particularly true. Increase in knowledge has made diagnosis more difficult, and extended experience has proved the necessity for examination of the whole field. Chronic appendical disease may mimic the symptoms of gastric and duodenal ulcer and cholecystitis, and may exist in conjunction with one or other of these

lesions. It thus becomes incumbent upon the surgeon when operating upon the chronic abdomen to inspect all the abdominal viscera in much the same way that a dentist inspects all the teeth before proceeding to treat the diseased ones.

It is in this spirit that the treatment of renal mobility should be approached. Having ascertained that one or both kidneys are abnormally loose, it then becomes necessary to assess how far they are responsible for the symptoms of which complaint is made. All other possible explanations should be considered, and an attempt made to establish a definite link between cause and effect. It must also be remembered that other lesions may be associated with the renal displacement and require treatment as well. Particularly, if operation is decided upon, is it necessary to open the abdomen and examine the appendix, gall-bladder, and pelvic organs. This examination can very readily be carried out by opening the peritoneum from the loin and introducing the hand. The stomach and duodenum cannot accurately be examined in this way, but a previous X-ray investigation of these organs is always advisable.

The functional disturbances associated with renal mobility are so varied and widespread that it is often difficult to establish a direct relationship between them as cause and effect. Unless this can be done with reasonable probability, any operative treatment of the kidneys is empirical and is best not undertaken. The disturbances of the nervous system may depend primarily upon psychical abnormality, disturbed endocrinology, or chronic toxæmia, in which case the result of replacement of associated loose kidneys is likely to be disappointing. That abnormally mobile kidneys may play an important part as causal factors in chronic ill-health is certain, and the condition should be included amongst those to be taken into consideration when investigating individual cases. Upon the outcome of this investigation alone should rational treatment be based;

if it indicates the renal mobility as a primary or important secondary cause, the condition should be treated efficiently; but if the indications are in an opposite direction, operative treatment at any rate is inadvisable.

It is frequently asserted that, inasmuch as mobility of one or both kidneys may cause no symptoms whatever, renal mobility *per se* calls for no treatment. To some extent that is true; but it must be borne in mind that the fact that the condition appears to cause no trouble at a particular time is no guarantee that it will not do so in the future. What proportion of people go through life with abnormally loose kidneys and suffer no inconvenience from them there is no accurate means of telling. We do, however, know that many such persons remain apparently well for some years and then develop functional troubles of various kinds. As already stated, many more healthy women with movable kidney are met with under 30 than over 30 years of age. The development of abnormal mobility often precedes the onset of definite symptoms by some years. This fact, although perhaps insufficient to justify active treatment before the onset of trouble, should yet make us cautious about dismissing the existence of renal mobility as a matter of no moment because at the time it appears harmless. Care should be taken to avoid aggravating the condition by errors of dress, violent exercise, etc.

INDICATIONS FOR TREATMENT

1. **Pain.**—The various kinds of pains already described as occurring in association with movable kidney can only be relieved by treating the cause. It must be remembered that the pain of a mobile kidney may be referred to the shoulder-blade, to the thigh, to the region of the gall-bladder, to the appendical area, to the groin, and to the urethral orifice. Back-ache may also be due to renal mobility. There is a tendency, too, for the pain to become generalized and to extend into the abdomen, and sometimes all over

the body. This variable distribution and the marked differences in the character and severity of the pains that occur in different persons make it necessary to exercise great care in diagnosis. An important characteristic of the pain caused by movable kidney is that it is made worse by exertion and relieved by rest.

2. **Disorders of the sexual organs.**—Functional disturbances of the pelvic organs are frequently caused by renal mobility, and their existence, in the absence of any sufficient local cause, is an indication to treat an associated loose kidney. Troublesome vesical irritability in women is often due to a movable kidney and is cured by its fixation.

3. **Disorders of digestion.**—Chronic functional disturbance of the digestive system may be caused by movable kidney. Such cases often resist all kinds of general and medicinal treatment, and can only be relieved by checking the drag of the kidney.

4. **Disorders of the nervous system.**—Headaches, cerebro-spinal neurasthenia, tachycardia, and Raynaud's disease may be due to a movable kidney, which should be fixed or supported if other measures fail to relieve.

5. **Mental disorders.**—Depression, delusions and insanity have many times been cured by nephropexy. The advisability of treating associated renal mobility in such cases should be seriously considered in view of the gravity of the symptoms and the satisfactory results that have been obtained.

METHODS OF TREATMENT

Undue renal mobility can only be effectively restrained by mechanical means—i.e. by belts, trusses, etc., or by operation. The contention that it is possible permanently to restore a movable kidney to its normal position by keeping the patient recumbent for many weeks, and at the same time endeavouring to increase the amount of perirenal fat by

forced feeding, is unsound in principle and disproved by experience. The reasons for this statement are:

1. That the kidney is not kept in position by the perirenal fat.

2. That absorption of the fat of the "capsula adiposa" appears in most cases to be a result, and not a cause, of the abnormal mobility. It is frequently observable when there is no general wasting.

3. That in movable kidney the perirenal fat is replaced by fibrous tissue, which forms adhesions between the true capsule of the kidney and the perirenal fascial capsule and structures immediately contiguous to it. These adhesions drag upon the kidney, and must be divided before the latter can be made to retain its normal position without support. It is highly improbable that any process of fattening can bring about the disappearance of these adhesions. The mere deposit of fat in their meshes, even if it occurred, would not counteract their drag upon the kidney.

The futility of attempting to replace a loose kidney by rest and forced feeding is abundantly evident from clinical experience. I have seen many patients in whom it has been tried without success, the kidneys remaining freely movable in spite of a general increase of adipose tissue.

It is probable that prolonged rest in the recumbent position would be beneficial in cases of recent displacement of the kidney by overstrain or external violence. The rest would protect the overstretched renal supports from strain and allow of the formation of new adhesions, and so prevent the kidney from acquiring undue mobility. Such cases are, however, rarely diagnosed at the time, and it is only later that the effect of the injury upon the kidney becomes apparent.

TREATMENT BY BELTS, TRUSSES, ETC

Various appliances have been devised for the purpose of supporting and restraining the range of mobility of loose

kidneys. Of these the best known are Treves' truss and Suckling's belt. Treves' truss consists of a specially shaped pad, which is made to press upon the front of the loin by means of a metal spring that encircles the body. In principle it is identical with the ordinary trusses for hernia. Suckling's belt is an ordinary abdominal belt with a device for exerting special pressure immediately below the kidney. This consists of a rubber air-pad placed inside the belt. The pad is distended with air by means of an attached tube and valve, and the pressure it exerts is intensified by a small steel spring fitted over the pad.

Whatever appliance is used, it is absolutely essential that it be put on while the patient is recumbent ; otherwise there is great likelihood of the pad being placed upon, or above, the prolapsed kidney.

There are many difficulties in connexion with the mechanical control of movable kidneys, and no contrivance has yet proved very satisfactory. The kidneys are deeply placed, and great pressure is necessary to overcome the resistance of the abdominal muscles and approximate the anterior and posterior boundaries of the lower part of the renal fossa. The necessary pressure is always irksome and frequently insupportable, and this is especially the case when the kidney is tender. Further, when the kidney is freely movable, any sudden effort may force it under the pad, which then presses upon it, or above it, and prevents its return to the loin. It is not at all unusual to find the kidney altogether below the pad, even though the truss or belt has been correctly applied while the patient was lying down. A special disadvantage in connexion with Treves' truss is the atrophy of muscle that results from the pressure of the pad. Stuart Tidey records a case where the abdominal wall at the site of the pad was no thicker than a sheet of paper.

Belts, etc., are obviously useless in cases of rotated kidney and in cases in which it is impossible to reduce the kidney

under the ribs on account of adhesions. They are also practically useless, and may be harmful, if the kidney does not readily return to its normal position during recumbency. There is then great risk of the pad being placed upon or above the kidney.

When prolapse of the kidneys is associated with general visceroptosis, operative treatment of the former is rarely advisable. Such cases are best treated by a belt or corset which gives firm support to the lower abdomen and generally "lifts up" the viscera. This has the effect of steadying the kidneys and limiting the range of their movements. Personally, I have obtained the best results in this class of case from Spirella corsets. A belt does not give sufficient support to the back in women, and unless very carefully fitted has the effect of compressing rather than lifting-up the contents of the lower abdomen. Thin soft pads may be placed inside the corset to lie over the iliac fossæ. These give a little extra support without causing irksome pressure.

A prolonged experience of special belts and trusses designed to support prolapsed kidneys has convinced me that their general use is undesirable. They are seldom permanently satisfactory, and the prolonged severe pressure upon the colon cannot be altogether harmless. On several occasions I have seen carcinoma of the ascending colon develop at the site of pressure of a hard kidney pad, and the possible significance of this must be noted. Further, as already stated, chronic appendical disease is very often found in association with prolapse of the right kidney, and the pressure of a pad may aggravate this. The main indication is, however, provided by the patient's own feelings. If discomfort is caused and the truss or belt is irksome, it should be discontinued. If, on the other hand, comfort is obtained by wearing it, there is probably no undue risk in continuing its use.

Mechanical support may be temporarily employed for diagnostic purposes. It may be difficult to establish a

definite connexion between symptoms and associated renal mobility, and improvement in the former when the kidneys are supported provides the link between cause and effect. If benefit is obtained from mechanical support, nephropexy can be advised with good prospects of therapeutic success.

TREATMENT BY OPERATION

The only effective way of permanently restoring a movable kidney to its normal position is by means of an open operation. This can now be done with safety, precision, and permanent success. This being the case, nephropexy becomes analogous to radical cure of hernia, the same surgical rules applying to the selection of cases for each procedure. Given a patient in whom symptoms are present that call for treatment of the movable kidney, the choice between trusses and belts or operation will be determined by (1) the type of displacement, (2) the nature of the symptoms, and (3) the age, occupation, and general condition of the patient. It must, however, be remembered, that it is far less easy to control a movable kidney by means of a truss or belt than it is to control a hernia by the same means. The argument in favour of nephropexy is therefore stronger than that for the radical cure of hernia, if considered purely on surgical grounds.

1. **The type of displacement.**—It has already been stated that certain forms of displacement of the kidney cannot be efficiently rectified by external mechanical means.

i. A rotated kidney may not descend at all below the normal level, and if it does the amount of prolapse is usually trifling. Pressure by means of an external pad will not prevent the rotation, and may easily make matters worse.

ii. Very freely mobile kidneys are difficult to control by a truss or belt. The kidney is very apt to slip beneath or below the pad while the appliance is being worn. The pad will then, by pressing directly upon the kidney, or

by keeping it constantly in a very low position, actually aggravate the condition.

iii. Kidneys which have contracted adhesions and do not return to the normal position when the patient lies down are unsuitable for treatment by palliative means for obvious reasons.

iv. Operation is advisable when palliative measures have been tried and failed. This may be due to inability of the patient to bear the pressure of the pad, or to failure of the appliance to control the mobility.

2. **The nature of the symptoms.**—In the main, local symptoms definitely caused by the movable kidney call for operation rather than palliative treatment.

i. Tenderness of the kidney and of the loin often makes it impossible for the patient to bear the pressure of the pad, and necessitates operation.

ii. Repeated attacks of severe pain from twisting of the renal pedicle or obstruction of the ureter call for nephropexy. Not only do such attacks seriously interfere with the functions of the kidney and ultimately cause more or less permanent damage to it, but they cause great suffering. Such attacks can only be effectively prevented by operative means.

iii. An enlarged, movable kidney should be operated upon. If the enlargement is due to hydronephrosis it may be possible to save the kidney by operation when done at a reasonably early stage.

3. **The personal equation of the patient.**—This has a most important bearing upon the question of operation. As in all other operations for conditions which do not threaten life, the age, occupation, and general condition of each patient must be carefully considered.

i. *Age.*—There does not appear to be any added operative risk in the case of middle-aged and even elderly people whose general condition is good. I have several times operated upon people considerably over 50 years of age,

and on one occasion upon an old lady of 70, with most satisfactory results. It must, however, be remembered that the older the patient the less the gain, because of the shorter expectation of life. Further, the strain of life is usually less severe after the age of 50, and the support of a belt may meet all requirements. Only in the presence of urgent symptoms, and particularly of pain, does operation become advisable.

In young persons, and in early middle life, the indication is quite different. Movable kidney is a condition which tends to get worse and to cause more serious symptoms as time goes on. Working efficiency is diminished by it, and belts and trusses are unsatisfactory during active life. They do not cure, and must be worn continuously. The outlook of a patient with 40 or 50 years of probable life ahead is unsatisfactory. In such cases nephropexy is a far more satisfactory procedure ; it not only cures existing symptoms, but prevents the development of others at a later period. In particular, it is advisable to operate in the case of girls about to marry, and in young married women who suffer from functional derangements of the pelvic organs and general debility. Experience teaches that many women with movable kidney break down after confinement, recovery taking place very slowly, and often never being complete.

ii. *Occupation.*—Movable kidney causes more trouble in people who are compelled to lead an active life and are subjected to prolonged physical and mental strain than in those who lead an easy, indolent life, and can rest when and for as long as they please. In men, particularly those engaged in manual labour, it is a serious handicap, and may prevent them from working. Amongst women, nurses, shop assistants, schoolmistresses, and busy housewives with small children suffer most severely. Fixation of the kidney by operation is preferable to the use of belts, etc., when the patient wishes to engage in active pursuits which tend to aggravate the symptoms.

iii. *General condition.*—A careful examination of the chest, abdomen, urine, etc., should be made. Heart disease, phthisis, malignant disease, and organic nerve-lesions should be sought for and excluded. Chronic bronchitis makes the prospects of a satisfactory fixation doubtful. Very stout persons are not good subjects for operation on general grounds, and also because in the sufferers from movable kidney obesity is usually associated with great muscular flabbiness and general loss of tone. Real dangers in such cases are cardiac thrombosis and embolism. Fortunately, obesity and renal mobility are not often associated. When they are, obesity is the outcome of prolonged inactivity and over-feeding, the latter often being encouraged in the belief that a deposit of fat around the kidney will check the mobility. If such cases are operated upon, a preliminary course of massage and of strychnine by the mouth is advisable. General splanchnoptosis, as remarked elsewhere, is a contra-indication to nephropexy, support by means of an elastic belt giving the best results. It must, however, be remembered that the right kidney is usually the first organ to prolapse, and that replacement of it may check further displacement of other organs.

In the selection of cases suitable for nephropexy, experience has taught me that the following three factors should receive special consideration :—

(1) Elimination of Congenital Degeneracy.—It is important to ascertain what mental and physical standard of efficiency can be expected of the individual. This can best be obtained by going carefully into the past history. If, up to early adult life or later, there is evidence that a normal level existed and that mentally and physically there were no indications of congenital deficiency, a standard for the individual is provided. The fall from this is almost certainly due to acquired causes, and removal of these should result in restoration to a normal state of health. If, on the other hand, the history reveals that at no period in

life was the patient of average standard, it becomes highly probable that congenital factors are largely responsible for the lack of efficiency and symptoms complained of. Such cases are not likely to benefit sufficiently from nephropexy to make the operation worth while.

(2) Effect of Posture.—Movable kidneys almost invariably return to a normal position in the loins when the body is in a recumbent position. All symptoms caused by them should then subside and the patient feel definitely better. In other positions the kidneys become displaced, with resulting aggravation of symptoms. It is all-important to establish a relationship between posture and symptoms. If it is ascertained that lying down brings relief while prolonged sitting or standing and physical exertion aggravate the symptoms, it becomes highly probable that the renal mobility and associated disturbances are related as cause and effect. This relationship may be further tested by supporting the kidneys mechanically over a period of a few months. In this way causes of neurasthenia and functional disturbance of psychical and toxæmic origin can be differentiated with fair success from cases presenting very similar symptoms due to renal mobility.

3. Loss of Weight.—So commonly do patients suffering from renal mobility show signs of impaired nutrition that their absence creates suspicion. A patient presenting no physical evidence to support a complaint of functional disturbance is unlikely to derive benefit from local treatment of the kidneys, even though the latter are abnormally mobile. The exceptions are those who have accepted the limitations of physical activity imposed by their handicap and have led an easy and unexacting existence. The weak link in a chain only becomes of importance when strain is put upon it. More often in these cases the symptoms are due to pure neurosis, and in the absence of definite local symptoms connected with the kidneys they are unsuitable for nephropexy.

Very careful consideration is called for before deciding whether to advise operation or not in cases where symptoms have existed for many years. Many of these patients have become confirmed neurasthenics, and although it is fairly certain that renal mobility originally caused the ill-health and has been responsible for its persistence, it is by no means certain that substantial benefit would be conferred by nephropexy. Such patients have acquired invalid habits and may have lost the desire to get well. Persistent irritation of the nervous system has induced secondary changes in the controlling centres which may persist after removal of the primary cause. Duration rather than severity of symptoms is the unfavourable factor. Unless there is an active desire on the part of such patients to get well, and unless the operation can be followed by prolonged treatment of the neurasthenia, they are best not operated upon. The gradual deterioration of the nervous system that is caused by nephroptosis is a strong argument in favour of early operation. In the early stages complete restoration to health follows much more frequently than is the case later on.

CHAPTER XIII

NEPHROPEXY

Hahn, of Berlin, in 1881, first succeeded in anchoring a movable kidney by operation. Through a lumbar incision he sewed the fatty capsule to the back and plugged the wound with gauze. Newman, of Glasgow, performed the first nephropexy in England, in 1882; Weir, in America, in 1882; and Bazy, in France, in 1883. Subsequently the operation was performed with increasing frequency all over the world, many different methods being employed. Many of these were crude and unsatisfactory and justly fell into disuse. To Goelet, of New York, belongs the credit of emphasizing the importance of replacing the kidney at its normal level. He pointed out that kidneys fixed too low down often give rise to greater trouble than when mobile.

In order to obtain permanent and successful results it is essential, when operating for movable kidney, to pay strict attention to the following points in technique :—

1. Great care to secure asepsis is essential. The loose fat of the loin has very little power of resistance to microbic invasion. For this reason rubber gloves should be worn by the surgeon, since considerable handling of the kidney and the tissues of the loin is necessary. It is also advisable to drain the wound by a rubber tube. Unless this is done a considerable quantity of blood-serum and liquefied fat accumulates in the depths of the wound. This fluid may force its way to the surface and escape about the tenth day. Occasionally, it appears to become infected from the colon.

Drainage obviates this risk, and, if the drain be removed at the end of forty-eight hours, does not in any way interfere with healing by first intention.

2. All unnecessary injury to the muscles and nerves of the abdominal wall, and of the tissues of the loin, must be avoided. Muscle-fibres should be separated rather than divided ; the nerves crossing the field of operation should be identified and safeguarded ; and there should be no unnecessary bruising of the fat surrounding the kidney. Adhesions should be cleanly cut by scissors, rather than torn through and stripped away by the fingers. Hernia of the wound and persistent pain after operation from inclusion of a nerve in a stitch can be avoided by the exercise of reasonable care.

3. All buried sutures should be absorbable. Buried silk sutures occasionally give rise to troublesome sinuses, and necessitate a subsequent operation for their removal.

4. The kidney must be absolutely freed from all adhesions until attached by its pedicle only. This is most essential, for no method of fixation will overcome the drag of fibrous adhesions. The object of the surgeon should be so to detach the kidney that it will stay in any position in which it may be put, the only force tending to cause displacement being that exerted by its own weight.

5. The renal vessels and upper part of the ureter and pelvis should be carefully examined for abnormalities. This can readily be done from the loin, the anterior method of approach being quite unnecessary.

6. The muscles of the back where the kidney is going to lie should be bared, in order that adhesions may form between the posterior surface of the kidney and muscle without the intervention of fat, which would greatly weaken the new attachment. It is unnecessary to remove any fat from the loin, there being ample room for it in front of, and below, the kidney when in its new position.

7. The capsule of the kidney alone should be used for

purposes of support. If sutures are used they should merely pass beneath the capsule, and never through kidney substance.

8. The kidney should be placed as nearly as possible in its correct anatomical position. The only reason for deviating from this rule is insufficient room in the upper part of the renal fossa. This difficulty is occasionally encountered on the right side, the right lobe of the liver extending lower down than usual. The kidney must then be placed as high up as possible without being subjected to the downward pressure of the liver, which would almost certainly displace it. The contention of some writers, that it is immaterial where the kidney is placed, so long as it is immobilized, is unsound. Goelet states that "fixation of the kidney lower than normal is worse than mobility," and that "this is what produces the great percentage of failures." With this statement I entirely agree. Several times I have had to operate upon kidneys which had been previously fixed at too low a level and which were causing severe pain and other local disturbances. I have known, also, of several cases where nephrectomy was performed for hydronephrosis developing after defective fixation.

The advocates of anterior nephropexy contend that it is impossible to determine the correct position of the kidney from the back. Professor Arthur Robinson very kindly assisted me to investigate this point. Dissections of formalin-hardened bodies were made. It was found, with great constancy, that in the normally placed kidney the angle formed by the last rib and the outer edge of the erector spinæ corresponds to a point on the posterior surface of the kidney midway between the upper and lower poles and about halfway between the hilum and the convex border. The length of the rib is immaterial. It thus becomes perfectly easy to determine accurately the level at which to place the kidney when operating from the back.

9. It is undesirable to "fix" the kidney. The normal

kidney moves slightly with respiration, and it is undesirable to prevent this. Methods which immobilize the kidney by fixing it to the muscles of the back by sutures or strips of the capsule are to be deprecated. By attaching the kidney to structures which form part of the chest-wall, and which therefore move with respiration, the normal respiratory movement of the kidney is retained. Finally, the sutures, etc., used to support the kidney should be loose. Their object is to prevent displacement by accidental strain—e.g. during postanæsthetic vomiting—and not to hold it in position by continuous pull.

An account of the many methods of performing nephropexy that have been suggested would be profitless.

THE AUTHOR'S TECHNIQUE

In devising an operation which would comply with the requirements of an ideal nephropexy I first obtained the help of Prof. Arthur Robinson in determining the level at which the kidney should be placed from landmarks revealed when approaching it from the back. Any point in connexion with the various operations devised by other surgeons which appeared to be of value was utilized. This standardized operation was described by me in the *British Medical Journal* (November 30th, 1907). I have now performed it upon upwards of fifteen hundred patients, and it has proved so satisfactory that I have seen no reason to modify the technique in any essential respects. Thus, Edebohls' incision is used ; Fullerton's method of utilizing a part of the capsule for the purpose of suspending the kidney from the arcuate ligament has been employed in a modified form ; and Goelet's plan of supporting the kidney by two silkworm-gut sutures, used as described by Brödel, is embodied. To these writers full acknowledgment is due.

Preparation of the patient.—It is well to keep the patient in bed, on a light diet, for two days before the operation. Flatulence is the cause of much of the post-

operative discomfort, and this can be minimized by careful attention to diet and the state of the bowels for some time beforehand. A course of strychnine, taken by the mouth in 5-minim doses during the preceding week, is also useful in preventing postoperative vomiting and bowel disturbance.

The skin of the loin must be carefully prepared in the usual way with a view to rendering it as sterile as possible.

Position of the patient, etc.—A good light from above is very desirable. The patient is placed on her side, the loin to be operated upon being uppermost. A shaped sand-bag, or rubber air-cushion, is put under the lower loin, the thighs are flexed almost at right angles with the body and a pillow is placed between them, and the uppermost arm lies in a padded arm-rest fixed to the table. In this way stability is secured and compression of the chest avoided. The surgeon stands facing the patient's back, with his principal assistant opposite.

Care must be taken by the anæsthetist that the patient's arms do not fall into a position in which the nerves of the brachial plexus would be injuriously pressed upon. On several occasions I have known complaints after operation of numbness and pain in the arm and hand caused in this way.

When both sides are to be operated upon, it is better to arrange the patient as above, and at the conclusion of the first operation to turn her over, rather than to adopt the plan suggested by Edebohls. This consists in placing the patient face downwards with a pillow under the abdomen. The advantage is that both sides can be dealt with without moving the patient. This advantage is, however, outweighed by the difficulties experienced in administering the anæsthetic. The pressure of the pillow seriously embarrasses breathing.

The operation.—The angle formed by the lower border of the 12th rib and the outer edge of the erector spinæ is identified. The incision commences over the 11th inter-

space and is carried downwards, with a slight inclination outwards, for about 3½ inches (Fig. 7). It runs parallel with, and slightly in front of, the outer edge of the erector spinæ. The tip of the 12th rib is practically useless as a guide to the line of incision, the length of the rib varying considerably in different persons.

After division of skin and subcutaneous tissue, the fibres of the latissimus dorsi muscle are seen running parallel with

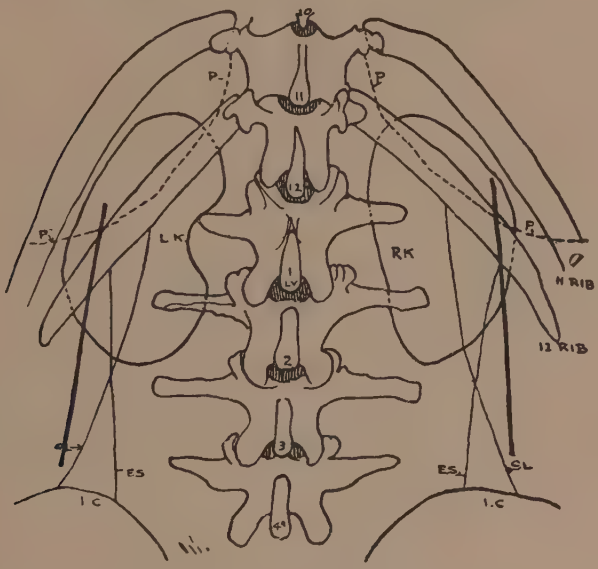

Fig. 7.—Lines of incision in nephropexy.

the skin incision. These fibres are separated, the blade of the knife usually being necessary to divide many strands of connective tissue which bind them together. No muscle-fibres need be cut. The separated portions of the latissimus dorsi are drawn apart with retractors. The free posterior edge of the external oblique muscle is then defined and pulled forwards. A space is now exposed, which is bounded posteriorly by the outer edge of the erector spinæ and quadratus lumborum, anteriorly by the retracted border

of the external oblique, and above by the last rib, or the external arcuate ligament. The floor of the space is formed by the lumbar aponeurosis, which is covered to a variable extent by muscle-fibres of the internal oblique. These fibres can usually be drawn downwards and forwards, but some division of them may be necessary (Plate IX).

Before incising the lumbar aponeurosis, an attempt should be made to ascertain the position of the last dorsal nerve. This runs a variable course. Usually it lies beneath the lumbar aponeurosis as it crosses the field of operation, but may pierce it while close to the erector spinæ. The nerve may cross the exposed space almost horizontally close to the rib, or it may cross more obliquely in the lower part of the wound. When the last dorsal nerve is situated high up near the rib, the ilio-hypogastric nerve may also be encountered in the lower part of the space. Both nerves must be carefully protected from injury. The accompanying veins can usually be seen through the lumbar aponeurosis and form a useful guide to the nerves. The aponeurosis is incised, if possible, above and in front of the nerve, which is then gently detached from its under surface and drawn downwards and backwards. The wound is opened by introducing the fingers and forcibly separating the edges.

The fat within the loin is now exposed, and the position of the kidney can be ascertained. If it is desired to investigate the interior of the abdomen, the anterior edge of the wound is drawn forwards and the peritoneum identified and incised. Through the opening thus made the colon, the appendix, the gall-bladder, the pelvic organs and the pylorus can be examined. Visual inspection may be aided by using a Fergusson's vaginal speculum. It is now my invariable rule to open the peritoneum from the right loin, and, after a general investigation of the abdominal viscera, to remove the appendix. In nearly all cases this can readily be done by pulling up the cæcum. In the few cases where it is impossible to do this on account of adhesions

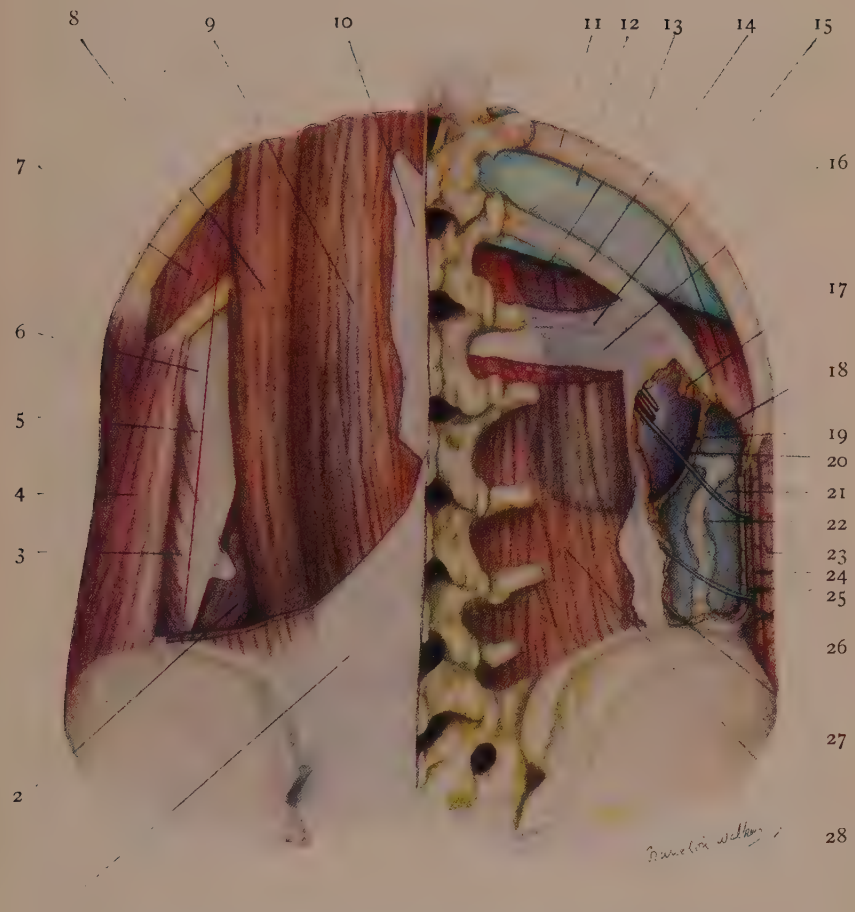

PLATE IX.—Posterior nephropexy (Author's method). Surgical anatomy.

1, Latissimus dorsi; 2, Quadratus lumborum; 3, Internal oblique; 4, External oblique; 5, Line of incision; 6, Lumbar fascia; 7, External intercostal; 8, Ilio-costalis; 9, Longissimus dorsi; 10, Serratus posticus inferior; 11, 11th rib; 12, Pleura; 13, Diaphragm; 14, 12th rib; 15, Ligamentum arcuatum externum; 16, Lumbar fascia (anterior lamella); 17, Perinephric fat; 18, Liver, peritoneum intervening; 19, Kidney; 20, Last thoracic nerve and vessels; 21, Peritoneum; 22, Non-peritoneal area of colon; 23, External oblique; 24, Internal oblique; 25, Transversalis; 26, Ilio-hypogastric nerve; 27, Ilio-inguinal nerve; 28, Quadratus lumborum (upper part removed).

which fix the appendix in the pelvis, its removal is effected through a separate incision at the conclusion of the kidney fixation. The opening in the peritoneum is then closed with a continuous catgut suture, and the operation continued.

Before proceeding to deliver the kidney the fat and perinephric fascia are separated from the muscles of the back for some distance above and below the last rib. This prepares a space outside the perinephric fascia in which the kidney will subsequently lie with its posterior surface adjacent to the bared muscles. By first detaching the posterior connexions of the perirenal capsule, the capsule with its contained fat, when separated from the kidney, falls away from the wound and does not obstruct the later stages of the operation.

The posterior layer of perinephric fascia is incised far back in the loin. It must be remembered that the peritoneal relations of the kidney are often altered, and that the peritoneum may extend much farther back than usual. The colon, also, may lie between the kidney and the wound. The danger of injuring the colon or peritoneum is minimized by opening the perirenal capsule as far back as possible. The opening made by the scissors is enlarged by the fingers and the kidney pulled out of the wound. This is most easily accomplished by hooking a finger round the adhesions at the upper pole and drawing the kidney out upper end first.

With the kidney on the loin, all adhesions and fat are carefully separated. This is best done by means of scissors curved on the flat. The blades of the scissors are kept closely applied to the capsule of the kidney, and each adhesion is examined before being divided. Care must be taken to avoid accidental division of accessory vessels, since these retract deeply into the loin and may cause troublesome bleeding. The kidney is cleared until it remains attached by its pedicle only. Finally, an examination of the state of the ureter, pelvis and renal vessels is made.

A triangular flap of kidney capsule is now formed. A small opening is made at the upper pole, through which the handle of a knife or a special spatula is introduced. With this the capsule is carefully separated from the cortex, a species of blister being formed on the surface of the kidney. The formation of the flap is completed by means of scissors, which divide the capsule at the edges of the blister. When it is formed in this way there is less risk of wounding the cortex than if the flap were outlined by incisions through the capsule with a knife prior to detachment. The flap remains attached by its base, which crosses a little below the centre of the convex border. The whole of the posterior surface and the outer two-thirds of the anterior surface of the upper two-thirds of the kidney are denuded. A pair of Spencer Wells forceps is placed on the apex of the flap, in order that it may be easily identified later (*see* Plate X).

Two silkworm-gut sutures are then introduced, stout strands being selected. The first enters the capsule just below the baseline of the flap, the second midway between this line and the lower pole. The needle passes between the capsule and the cortex without entering the latter. A much firmer hold is obtained by passing the needle under the capsule twice in the same direction, as shown in Plate X, before returning. The free ends of each suture are separately clamped.

The kidney is returned into the loin lower pole first. If the perinephric capsule has been previously detached, as described, the kidney will lie outside it and immediately adjacent to the denuded muscles.

A curved pair of Spencer Wells forceps is forced through the 11th interspace and made to project below the last rib into the upper part of the wound immediately in front of the angle formed by the rib and erector spinæ. By using a blunt instrument, such as a Spencer Wells forceps, and keeping close to the rib, there is practically no danger of wounding the pleura. The blades of the forceps are opened

PLATE X.

Fig. 1.—Appearance of kidney after the capsular flap has been formed and the Brödel suspensory sutures have been inserted.

Fig. 2.—Upper pole of right kidney as seen from above. Two-thirds of the posterior surface, and one-third of the anterior surface, denuded by the reflection of the capsular flap.

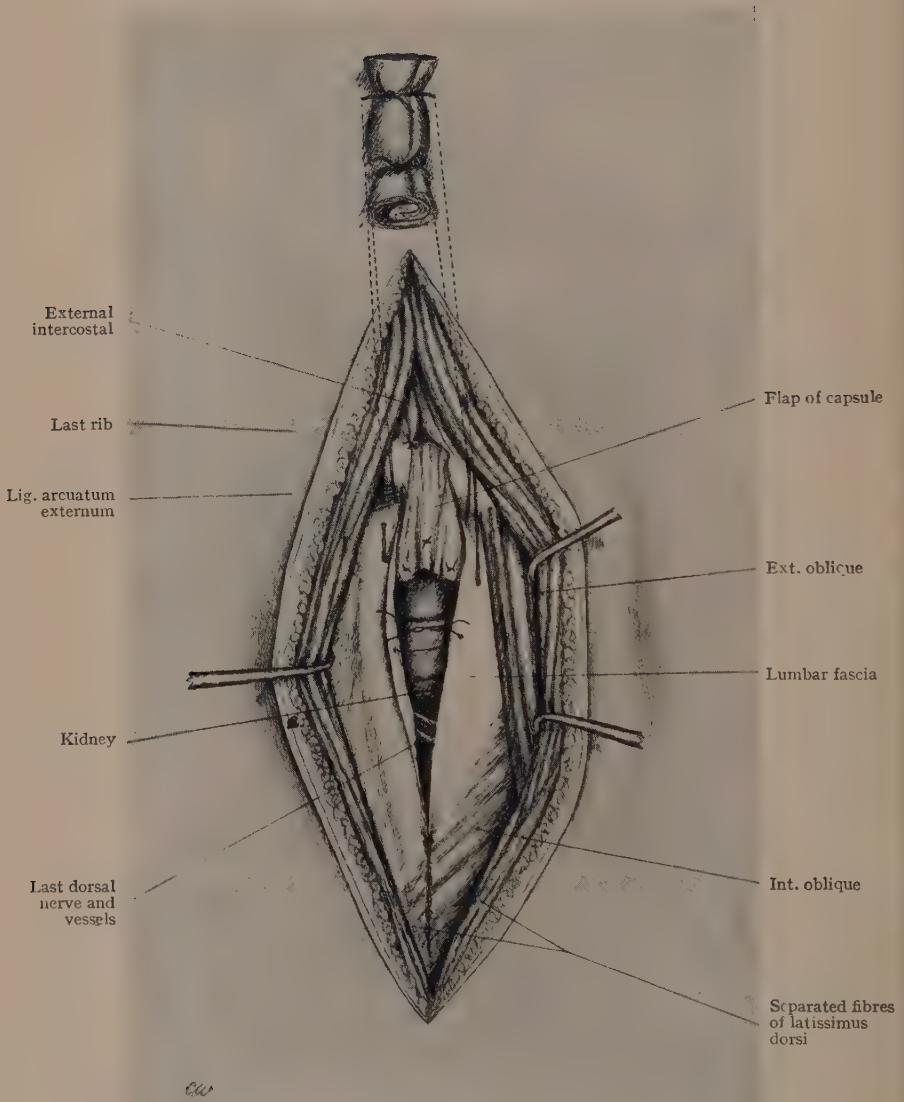

PLATE XI.—Appearance of wound just prior to insertion of skin stitches. The capsular flap sutured in place, and the suspensory stitches tied over a roll of gauze above the wound.

and the apex of the capsular flap seized. The forceps are then withdrawn and the kidney pushed up from below until the base line of the flap is level with the lower border of the rib.

Before suturing down the flap, the kidney is retained in position by means of the Brödel sutures. A long-handled needle enters the skin about an inch above the top of the incision ; it passes through the muscles superficial to the rib and is made to pick up one edge of the divided lumbar aponeurosis as it emerges in the loin just below the rib. A free end of the suture is now threaded into the eye of the needle and the needle withdrawn. The needle is again introduced at the same level as before, the puncture being about ¾ inch away from the first. This time the needle picks up the other edge of the lumbar aponeurosis. It is threaded with the remaining free end of the upper suture and withdrawn. The free ends of the lower suture are brought out through the muscles and skin in precisely the same way, the punctures in the skin being about ¾ inch below the upper ones. The sutures are then drawn just taut and tied over a piece of rubber tubing which lies on the skin entirely above the wound.

The capsular flap is now spread out and fixed to the capsule of the lower part of the kidney by several points of suture. Chromicized catgut is used for this purpose. Finally, a suture is passed through the flap at the point where it emerges from the intercostal space. This anchors it to the adjacent aponeurosis and acts as a tension stitch protecting the lower line of sutures (Plate XI).

The opening in the lumbar aponeurosis is closed by several buried catgut stitches, a small space being left open for the introduction of a small tube immediately below the kidney. It is important to introduce the tube into the space surrounded by the perinephric fascia in which the kidney originally lay. Unless this is done a hæmatoma may form and give rise to a swelling closely resembling an

enlarged kidney. Finally, the separated muscles are approximated, and the skin incision closed (Plates XII, XIII).

Before the bandage is applied, the patient is turned on to her back and a large pad of wool placed in front of the loin and inside the anterior superior spine. The object of this is to approximate the walls of the space below the kidney.

The time occupied when both kidneys are operated upon

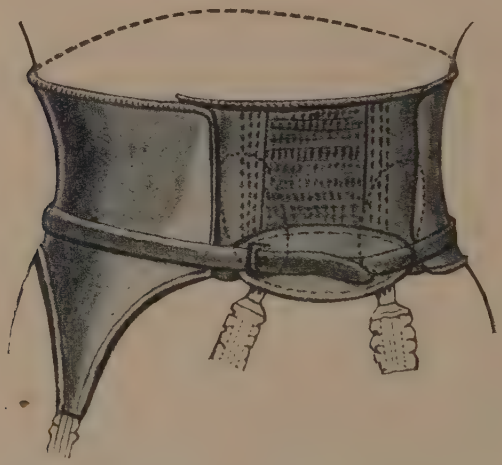

Fig. 8.—Belt designed by the author for use after nephropexy.

and the appendix removed at the same sitting is about one hour.

The tube is removed in forty-eight hours, the skin stitches on the eighth day, and the Brödel suspension stitches in three weeks, after which the patient is allowed to get out of bed. She is then supplied with a light belt made for me by Messrs. Salt, of Birmingham (Fig. 8). This belt is designed to support the lower abdomen, and extra pressure is secured over the lower part of the renal fossæ by means of two soft pads of wool covered with wash-leather. The belt is worn over a vest. The patient is instructed to wear

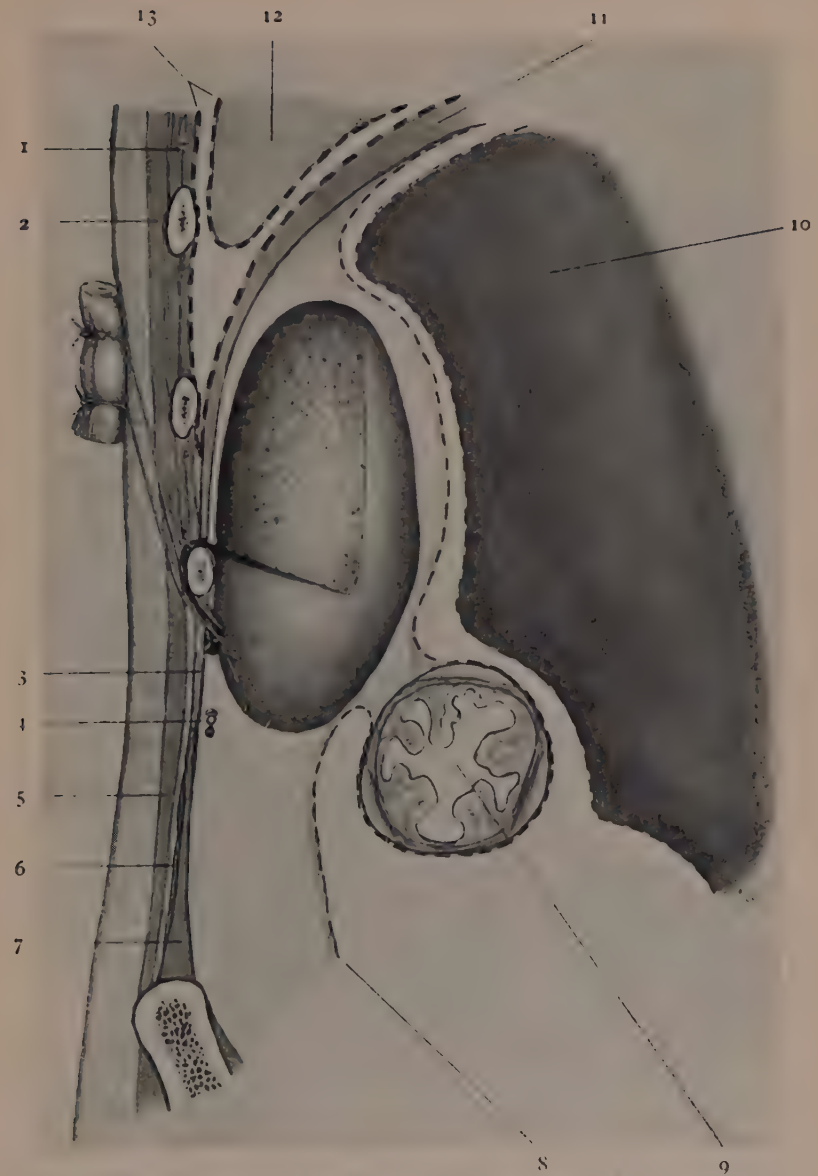

PLATE XII.—To show the position of the kidney and the arrangement of the capsular flap and suspensory stitches at the close of the operation.

1, Intercostals; 2, Latissimus dorsi; 3, Lumbar fascia; 4, Last thoracic nerve and vessels; 5, Latissimus dorsi; 6, Internal oblique; 7, Quadratus lumborum; 8, Peritoneum; 9, Colon; 10, Liver; 11, Diaphragm; 12, Lung; 13, Pleura.

PLATE XIII.—Appearance of wound at end of operation.

the belt during the daytime and to avoid heavy lifting and violent exertion for six months, after which time all supervision is withdrawn.

In my last series of 300 cases there has been one death only. This was due to complications following infection with influenza during convalescence. In the whole series of upwards of 1,500 patients there have been 3 or 4 deaths from pulmonary embolism and one from shock. To say that nephropexy has no risks would be folly, but it is correct to say that there are no special risks beyond those of any major operation, such as radical cure of hernia.

Very little shock is caused by the operation, even when both kidneys are operated upon at the same time. The fact that double nephropexy is attended by little more disturbance than the single operation was a surprise to me. In the first 70 cases I declined to operate upon both kidneys at the same time, believing that the dangers from shock and suppression of urine would be greater. Extended experience with the double operation has convinced me that the added risk is negligible. If both kidneys are movable, both may safely be dealt with at the same time. In this way better results are obtained, and a subsequent operation is avoided.

Considerable discomfort is experienced during the first two days after operation. This is caused by the irksomeness of lying continuously in the dorsal position and by flatulent distension of the bowel. The latter is an almost invariable sequel of the operation, and appears to be due to temporary paralysis of the colon and inhibition of the wave of peristalsis. It is best combated by calomel and enemata. Calomel (gr. iij) is administered twenty-four hours after operation, and enemata are given as soon as the discomfort becomes acute. The early discomfort is usually relieved by aspirin in 10-grain doses, morphia rarely being necessary. In no case have I seen any indications of threatened suppression of urine. The urine may contain traces of blood

for the first twenty-four hours, and albumin is frequently present for a week after operation. In some instances, where careful examination of the urine was made for several days, the percentage of urea was raised to upwards of 3 per cent., and a dense cloud of urea nitrate crystals was thrown down on the addition of nitric acid.

In a few cases a patch of dry pleurisy has complicated convalescence. It is particularly liable to develop when the urine is infected with B. coli at the time of operation. In no case has suppuration occurred, the inflammation subsiding in a few days.

PLATE XIV.—Scar, six months after operation.

CHAPTER XIV

RESULTS OF NEPHROPEXY

THE results of nephropexy have to be considered from two aspects: (1) the surgical success of the operation in permanently replacing the kidneys in their normal position without unsatisfactory sequelæ such as pain in the loin or back, hernia of the wound, and persistent sinus; and (2) its therapeutic value in curing or ameliorating the symptoms for which it is performed.

(1) **Surgical results.**—At first these were very unsatisfactory. In a large percentage of cases the operation failed to cure the abnormal mobility of the kidneys, and they were found loose again almost as soon as active life was resumed. Many operations fixed the kidney to the muscles of the back and at too low a level, with the result that pain in the back was common, and sometimes hydronephrosis developed. The use of silk and other non-absorbable suture materials was followed by persistent sinuses, and extensive damage to the muscles of the loin led to a feeling of weakness and hernia.

A further and very common cause of failure is the incomplete character of the operation. One kidney only is replaced while the other kidney, which may be also mobile, and a possibly diseased appendix are left untreated. Satisfactory therapeutic results cannot be expected unless the operation, as such, is successful. Only when the surgeon is satisfied that both kidneys are in a normal position and that possible associated or secondary

abdominal lesions have been excluded or treated can success be claimed.

The operation which I have performed upon upwards of 1,500 patients has been carried out in this spirit. My object has been to replace both kidneys, if both are loose, and to make sure that no intra-abdominal lesion is left undetected and untreated.

The surgical results have been very satisfactory. In no single instance have I found a kidney loose again, although on a number of occasions I have re-opened the loin thinking that it had become so. The usual course of error is a Reidel's lobe of the liver and on the left side a prolapsed spleen, conditions which may simulate a movable kidney very closely. In my earlier cases before I opened the peritoneum as a routine, an enlarged gall-bladder on several occasions was mistaken for a kidney which was thought to have broken loose after replacement. In no case has there been a persistent sinus and no second operation on this account has been needed. In some 20 cases I have had subsequently to excise a length of the last dorsal nerve on account of pain caused by its implication in scar tissue, and a few cases have been operated upon for hernia of the scar. Very occasionally, where at the time of operation a moderate hydronephrosis existed, this has increased and necessitated excision of the kidney. My experience has been that where the pelvis of the kidney is sufficiently dilated to hold more than about 2 oz. of urine, replacement fails to prevent its destruction by hydronephrosis, while if the pelvis is dilated to a less extent the operation succeeds in doing so.

The results in my large series of cases, extending over twenty-five years, have been such as to justify the claim that movable kidney can be treated successfully by operation, and that the operation is safe and comparatively easy. It is essentially a plastic operation, and if therapeutic results justify it there are no surgical reasons why it should not be done.

(2) **Therapeutic results.**—Very widely differing views are held as to the importance of movable kidney as a cause of chronic ill-health, and of the value of nephropexy as a therapeutic measure. In the early years of the present century extravagant claims were made that nephroptosis was responsible for a vast amount of functional disturbance of mind and body, and it was asserted that the kidneys should be fixed in such cases whenever any undue mobility was detected. The results of this were unfortunate, as they always are whenever the usual care in selection of cases is abandoned and a new treatment is applied indiscriminately. The claims that Koch's tuberculin is a cure for phthisis; that hunger pain in association with hyperchlorhydria indicates duodenal ulcer and calls for gastro-enterostomy; that the teeth are responsible for most cases of rheumatism and should be sacrificed wholesale; and that movable kidneys are the cause of much functional nerve disturbance and should be treated whenever found in association with it, have all led to disappointment when extensively acted upon. Medicine is much less simple than this, and a claim that a panacea has been discovered for any common disease or clinical syndrome generally brings disappointment when blindly applied.

The wide and indiscriminate operating for movable kidney was attended by unsatisfactory results and caused the pendulum to swing in the opposite direction, with the result that it is often asserted that nephroptosis is rarely of importance and still more rarely calls for treatment. The truth lies somewhere between these two extremes. Unquestionably, anyone who has carefully studied the problem and has brought to bear upon it the same care and judgment in the selection of cases suitable for operation, has paid the same attention to technique, and has followed up the operation by necessary after-treatment as for other surgical conditions, cannot fail to be convinced that nephroptosis may be a cause of lowered efficiency and chronic

ill-health and that treatment of it by nephropexy may be called for.

The points that should be considered when deciding the suitability or not of a particular case for nephropexy have already been discussed. The necessity for a satisfactory technique and a complete operation has been emphasized. It is, also, all-important to remember that time and suitable after-treatment are needed to complete the cure. So many operations are followed by immediate and dramatic benefit that disappointment is often caused to surgeon and patient when an interval of six months or a year must elapse before the beneficial results of the operation can be looked for. No patient can emerge from a state of severe and long-standing neurasthenia in a short time, even though the cause has been removed. This is the reason why so many cases operated on for movable kidney recover so slowly from the symptoms from which they were suffering at the time of operation. I never assess results until a full year has elapsed from the operation, and even this length of time is often insufficient, and only after two or three years is full health obtained. Two facts stand out in connexion with my results: (1) that the failures have never improved to any extent after operation, and (2) that whatever benefit is obtained is retained; relapse is almost unknown. Also, the farther back the investigation into results is carried the better they are. If only it became sufficiently realized that in a large proportion of cases the effect of nephropexy is to convert an incurable condition into a curable one and not of itself to establish a cure, the percentage of failures would diminish and the true value of the operation be better understood.

I would most emphatically state that no moral value whatever attaches to the operation. In my opinion the moral effect on the patient is wholly bad, and there is not one redeeming feature. From the moment operation is mentioned until it has been completely recovered from and

forgotten the effect is to put a further strain upon a mind and body already over-stimulated and exhausted. The whole question of operation is fraught with greater responsibility than usual, and unless it is felt that the benefit likely to result justifies it nephropexy should not be done. It is advisable to draw particular attention to this point, because I have often heard it asserted that the benefit that follows nephropexy is due to the moral effect of the operation upon the patient, and I have frequently been requested to perform it for that purpose. On one occasion I saw a man who had had an incision made into the loin to impress him that his kidney, which he had been told was loose, had been put right. Such procedures are entirely wrong. It is questionable whether the mental and physical injury caused by an operation ever confers any benefit except in so far as it remedies a physical trouble, and the harmful effects of operations, as such, are considerably greater in neurasthenic patients. It is, therefore, reasonable to assume that any benefit following nephropexy is due, not to the fact that an operation was done, but to the replacement of the kidneys that it effected.

RESULTS OF NEPHROPEXY IN MY OWN SERIES OF CASES

My personal experience of nephropexy extends over twenty-five years, and during that time I have operated upon more than 1,500 patients and replaced more than 2,000 kidneys, the double operation having been performed in the majority of cases. All my patients have been referred to me by practitioners, and it is their encouragement and support which has made me feel that the operation has justified itself. After all, in my opinion, it is the patient's own doctor rather than the surgeon who ultimately determines the value of any form of treatment. He has an intimate knowledge of his patient that no specialist can acquire: it is a knowledge based upon prolonged observation

of the patient himself and his reactions to and upon those who come in contact with him. Where neurosis and functional disturbance are predominant features, improvement is often more evident to the family doctor and the patient's relatives and friends than to the patient himself, and the doctor's verdict is perhaps the best test of value that can be obtained. On this verdict, rather than upon such tests as I have been able to apply personally, I have been content to rely. No more graphic description of the effect of the operation could be given than that volunteered by the husband of one of my patients, that "before the operation my home was a hell and now it is a heaven."

It is very difficult to obtain accurate statistical evidence of the therapeutic benefit conferred by nephropexy. Some years ago I made two different investigations. For the purpose of the first I wrote to 100 consecutive patients in my series, one full year having elapsed in every case between the operation and the inquiry. I was successful in obtaining information from 87 of these patients, and from that I ascertained that about 60 per cent. were well in the sense that they were leading ordinary lives and did not need medical attendance; 20 per cent. were considerably better, 10 per cent. were better, and 10 per cent. were no better.

The second inquiry took the form of a questionnaire addressed to 11 practitioners, 70 of whose patients I had operated upon. The questions submitted to them were: In the case of . . . . . (1) Has the operation been a surgical success—i.e. has it efficiently and permanently anchored the kidneys and has it been free from unpleasant sequelæ? (2) Has the general resulting benefit justified the operation?

Great care was exercised by the doctors to make the answers reliable, and each patient was either written to or personally interviewed. The actual replies were printed and circulated amongst the members at a meeting of the Surgical Section of the Royal Society of Medicine on January

13th, 1914. They indicated in all the 70 cases that the operation was a surgical success; in one case only, that of a lady, who complained of pain in her right side, was there any mention of after-trouble. Of the general benefit that resulted, only 5 were reported as failures, while many were described as having been changed from chronic invalids into absolutely normal people.

These satisfactory results do not appear to have been obtained by the majority of other surgeons, and the tendency is for fewer and fewer cases of nephroptosis to be operated upon. This led me to make a still further and more drastic investigation into my results. All the patients upon whom I had operated during the five years 1922-1926 were written to and invited to answer the following questions :—

(1) Have the operation wounds troubled you ? If so, in what way ?

(2) Have the symptoms for which the operation was performed been cured ?

(3) What is your present state of health ?

The number of patients written to was 213, and replies were received from 163.

It soon became evident from the replies that the answers to the first two questions were of little value and that the answers to the third supplied the true test.

All these patients had suffered from symptoms sufficiently severe to call for medical attendance, and had proved incurable by ordinary methods of treatment. The symptoms complained of were very variable, but in every case the renal mobility was held to be the principal cause. In every case the operation was a complete one—i.e. both kidneys were fixed when both were loose, and an abdominal exploration from the loin was carried out. In nearly all the appendix was removed.*

* A report upon this investigation was published in the *British Medical Journal*, December 1st, 1928, in a paper entitled "The Therapeutic Value of Nephropexy."

In order to obtain an independent and absolutely unbiased report the replies were submitted without comment to Professor Kauffmann, a physician of wide experience of both private and hospital patients, and endowed with exceptional critical faculties. I am very greatly indebted to Professor Kauffmann for the interest he has taken in this investigation, and I am convinced that his report will receive the consideration that it deserves. It estimates, as impartially as is possible, the true results of the operative treatment of nephroptosis.

PROFESSOR KAUFFMANN'S REPORT.

"The replies from 163 patients have been carefully considered with a view to my forming a conclusion as to the results of the operation for nephroptosis. I have, of course, only the patients' replies from which to judge, and a certain difficulty is introduced by the second question, inasmuch as many of them scarcely know or remember the groups of symptoms for which they sought advice. Guided by the kind of reply, and to some extent by the tone of the reply, I have divided these 163 cases into five groups, namely :—

"1. *Complete success*, where the statement warrants the name 29
"2. *Success* 42
"3. *Partial success*, where the benefit outweighs any remaining troubles.. 41
"4. *Partial failure*, where the remaining troubles outweigh such benefit as the patient has derived .. 22
"5. *Failure* 29

"I have not felt able to make allowances for such things as gravidity or possibly some new trouble coming on, as it must do in some proportion of the cases in an interval of several years. It is more than likely that some cases which would have been in one of the successful groups have been spoilt by new disease thus intervening.

"It seems, therefore, that taking complete success and

success together, these groups account for 43·6 per cent.; partial success accounts for 25 per cent.; failure for 17·7 per cent., and partial failure for 13·5 per cent. These figures are, I conclude, very satisfactory.

"By far the greater number, which constitute groups 1 and 2 together, have had appendicectomy as well as kidney fixation, generally double. But success is also found in those who only had a kidney fixation, single or double, done.

"I have considered the question whether the addition of appendicectomy, or other operation, has affected the results, but can get no satisfactory answer, since, in the successful group, nephropexies without other operation only formed 12·6 per cent., and in the partial failure and failure groups 13·7 per cent."

Commenting upon Professor Kauffmann's report, I would draw attention to the severity of the test applied. Results are mainly determined by the answer to the question: "What is your present state of health?" Only those cases in which the answer indicates that the general health is satisfactory in every way have been placed in the successful group. Patients who state that, although relieved of the symptoms for which the operation was done, they do not enjoy normal health owing to other troubles are labelled partial successes or failures according to whether their general health and working efficiency appear to have been improved or not. The disappearance of one set of symptoms and the substitution of another set in their place, with the result that comfort and working efficiency have not been materially improved, is regarded as evidence of failure. Further, as Dr. Kauffmann points out, no allowance has been made for the entirely new troubles which may reasonably be expected to develop in a certain number of cases over an interval of several years. The report, therefore, may be taken as indicating in a conservative way the proportionate effect of the operation in raising to a normal

standard of health patients who were in a state of chronic invalidism.

The following may be said to summarize the results of Professor Kauffmann's investigation of 163 cases, operated upon at intervals of from $6\frac{1}{2}$ to $1\frac{1}{2}$ years prior to the inquiry :—

Successful	.. 71, or 43·6%
Partially successful	.. 41, or 25·0%
Failures	.. 51, or 31·4%

Of these patients 13 were men and 150 were women.

These results, taking into consideration the kind of patients operated upon, though by no means justifying a claim that nephropexy is a panacea for neurasthenia and functional disturbance when complicated by renal mobility, are satisfactory. The patients had all undergone prolonged treatment and were referred to me because of their failure to benefit by it. They were the neurotic flotsam and jetsam who are the despair of their friends and medical attendant. Nearly all were in early adult life with many years of activity in front of them. They were most of them under the necessity of earning a livelihood or managing a household, and the change from chronic invalidism and inefficiency to normal health and efficiency that has been effected in nearly half of them would seem to justify the performance of an operation which is almost free from risk and which is essentially plastic in character.

Looking back over the long series of cases of nephroptosis that have come under my observation, upon only about one-third of which I have operated, I cannot help feeling that the results would have been better had the condition been effectively treated at an earlier stage. In no branch of surgery can the best results be expected in the later stages of disease and in the medical failures, and nephroptosis is no exception to the general rule.

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INDEX

Aberrant renal artery, a cause of hydronephrosis, 48
—— —— —— obstruction of ureter by, 96
Adhesions, fixation of the kidney by, 37
—— intraperitoneal, 40
—— perirenal, 35
—— to colon, 41
Albarran, 63
Albuminuria, 56
—— orthotic, 66
Amenorrhœa, cases of, 114
Anterior nephropexy, 150
Appendicitis, association with prolapse of right kidney, 110
—— differential diagnosis of, from movable kidney, 86
Atrophy of movable kidneys, 54
Aufrecht, 63, 132, 134
Author's belt for use after operation, 158
—— operation for movable kidney, 152
—— series of cases, 165
Autonomic nervous system, 62

Bacilluria, 57
Barling, 133
Beddard, A. P., 70
Bell John J., 60
Belts for nephroptosis, 139
Bradford, Sir J. Rose, 68, 69

Capsula adiposa, 35
—— —— atrophy of, 35
Case of dysmenorrhœa, 115
—— of endometritis, 115
Case of fixation of kidney by adhesions, 37
—— of gall-stones simulating movable kidney, 85
—— ofhydronephrosis secondary to nephroptosis, 48
—— of irregular menstruation and leucorrhœa, 114
—— of movable kidney and Dietl's crises, 52
—— of pyuria, 58
—— of Reidel's lobe mistaken for movable kidney, 81
—— of rotated kidney, 13, 98
—— of tachycardia, 127
—— of visceroptosis after parturition, 31
Cases of amenorrhœa, 114
—— of cerebro-spinal neurasthenia, 120
—— of colon tumours simulating movable kidney, 82
—— of dilatation of stomach, 109
—— of headache, 126
—— of movable kidney simulating appendicitis, 86
—— of sudden displacement of kidney, 93
—— of traumatic dislocation of kidney, 26
Classification of movable or dislocated kidney, 18
Cobb, Farrar, 57
Colitis, 111
Colon, adhesions to, 41
—— angulations of, 41
—— effect of renal mobility upon, 40
Coloptosis, 32
Congestion of movable kidney, 51

Constipation and movable kidney, 32
Curvature of the spine, effect on renal fossæ, 24

Debility, 24
Definition of movable kidney, 11
Depression caused by nephroptosis, 105
De Souza, 54, 69
Diagnosis of movable kidney, 74
—— —— —— difficulties of, 74
Dietl's crises, 51, 92
—— —— hæmaturia in, 52
Differential diagnosis, 80
—— —— appendicitis, 86
—— —— enlarged gall-bladder, 81
—— —— —— ovary, 83
—— —— gall-stone colic, 84
—— —— growth of colon, 82
—— —— Reidel's lobe, 80
—— —— renal calculus, 84
—— —— tumour of pylorus, 83
Dilatation of renal pelvis, 46
—— of stomach, 108
—— —— cases of, 109
Dislocated kidney, 12
Disorders of digestion, 107, 138
—— —— duodenal stasis, 108
—— of female sexual organs, 112
—— —— —— —— amenorrhœa, 114
—— —— —— —— dysmenorrhœa, 115
—— —— —— —— endometritis, 115
—— —— —— —— irregular menstruation, 114
—— of male sexual organs, 116
—— of mind, 128, 138
—— of nervous system, 117, 138
—— —— —— headache, 126
—— —— —— neurasthenia, 118
—— —— —— Raynaud's disease, 128
—— —— —— tachycardia, 127
—— of the sexual organs, 138
Division of the renal nerves, effect of, 70
Dress, errors of, effect on movable kidney, 29

Duodenal stasis, 108
—— —— caused by movable kidney, 38
—— ulcer, case of, 39
Duodenum, obstruction of, 4, 38

Edebohls, 151
Enlargement of kidney a cause of mobility, 33
Erect position, examination of loin in the, 79
Errors of dress, effect on movable kidney, 29
Etiology of movable kidney, 23

Examination of loin in erect position, 79
—— —— in lateral position, 78
—— —— in recumbent position, 76
Exciting causes of movable kidney, 25
Extent of renal mobility, 17

Fatigue, 102
—— toxins, 71
Fearnley, William, 66
Fiori, 63
Flashman, 129
Floating kidney, 17
—— ——, mesentery of, 17
Frequency of movable kidney, 21
—— —— —— sex influence, 22
Fullerton, 151
Functional disturbances of digestive organs, 108

Gall-bladder, enlarged, simulating movable kidney, 81
Gall-stones and renal mobility, 39
General pathology of movable kidney, 60
Gibson, G. A., 128
Glénard, 21
Glénard's disease, 10
Goelet, 21, 56, 66, 112, 150, 151
Guiard, 62

Hæmaturia, 56, 92
Headache and renal mobility, 126
—— —— —— cases of, 126
Heredity, influence of, upon nephroptosis, 24

Hydronephrosis, 48, 50
—— caused by aberrant renal arteries, 48
—— —— —— —— —— case of, 48

Indications for nephropexy 142
—— for treatment of movable kidney, 137
Infection of movable kidneys, 57
Insanity and renal mobility, 130, 132
—— toxic theory of, 129
Internal secretion of the kidney, 72

Jaundice and nephroptosis, 39
Jelliffe, 72

Kauffmann, 168
—— report, 168
Keith, Sir Arthur, 23
Kidney, within true pelvis, 43
Kidneys, normal mobility of, 12
—— pathological mobility of, 13
—— position of, 1
—— relations of, 3
—— supports of, 5
—— surface anatomy of, 1
Kinking of ureter, 2
Küttner, 21

Langdon Brown, 61
Lateral position, examination of loin in the, 78
Lindner, 21
Longyear, 32
Loss of weight, 105
Lucas-Championnière, 63
Lumbar ache, 99

Mackenzie Hector, 21
Mackey, 57
Male sexual disorders, 116
Mechanical theory of symptomatology, 60
Mechanism of displacement of movable kidney 116
Medico-legal aspects of renal displacement, 28
Mental disturbances associated with movable kidney, 130
Mesonephron, 17
Methods of treatment of renal mobility, 138
Morris, Sir Henry, 21
Mortality of nephropexy, 159
Mucous colitis, 112

Nephrocolic ligament, 32
Nephropexy, author's technique, 151
—— history of, 148
—— indications for, 137
—— mortality of, 159
—— results of, 161
—— —— author's series of cases, 165
—— —— surgical, 161
—— —— therapeutic, 163
—— selection of cases suitable for, 145
—— technique of, special points, 148
Nephroptosis, 11
—— more common on right side, 23
Nerves of kidney, 53
Nervous system, action of renal mobility upon, 131
Neurasthenia and movable kidney, 118
—— —— —— cases of, 120
Newman, David, 17, 64
Noble, 56, 67,
Normal mobility of kidney, 12

Obstruction of renal veins, effect of, 69
—— of ureter, effect of, 68
—— of vena cava, 40
Occlusion of renal artery, effect of, 70
Operative treatment of movable kidney, 142
—— —— —— —— indications for, 142
Orthotic albuminuria, 66
Osler, Sir William, 64
Ovary, enlarged, simulating movable kidney, 83

Pain in movable kidney, 92, 137
Palpable kidney, 12
Parturition and movable kidney, 30

Pathological changes in movable kidney, 44
—— —— in or near the kidney, 33
—— —— in surrounding structures, 34
—— mobility of kidney, 13
—— —— —— tests of, 12
Pathology, general, of movable kidney, 60
Pelvic organs, effect of movable kidney upon, 43
Perinephric fascia, 5, 34
—— —— effect of a mobile kidney upon, 34
—— —— external attachments of, 7
—— —— prolapse of, 8, 17,
Perirenal adhesions, 35
—— fatty capsule, 8
Peritoneal relations of loin, changes in, 41
Peritoneum, effect of dragging upon, 38
Pleura, relation of, to kidney, 3
Position of kidneys, 1
Predisposing causes of movable kidney, 24
Pregnancy and movable kidney, 30
Prolapse of perinephric fascia, 8, 17
Puerperium, influence of, 30
Pyelography, 46, 79
Pyuria, 57, 100
—— case of, 58

Raynaud's disease and movable kidney, 128
Recumbent position, examination of loin in, 76
Reidel's lobe simulating movable kidney, 80
Relations of kidneys, 3
Relative frequency of movable kidney in men and women, 22
Renal artery, effect of occlusion of, 70
—— calculus simulating Dietl's crises, 84
—— capsule, changes in, 44
Renal function, evidence in favour of disturbance of, 66
—— insufficiency, effect upon metabolism, 71
—— mobility, extent of, 17
—— —— normal, 12
—— —— pathological, 13
—— nerves, 53
—— —— effect of division of, 70
—— parenchyma, effect of mobility upon, 53
—— pelvis, changes in, 45
—— —— dilatation of, 46
—— pouches, 5
—— strangulation, 51
—— supports, 5
—— veins, effect of obstruction of, 69
—— vessels, effect of prolapse of kidney upon, 50
Report of Professor Kauffmann, 168
Results of nephropexy, 161
—— —— author's series of cases, 165
—— —— surgical, 161
—— —— therapeutic, 163
Robinson, Arthur, 2, 33, 151
Rotated kidney, 13
—— —— cases of, 13, 98
—— —— cause of, 15
—— —— symptoms of, 97

Savage, 129
Savile, 64
Senator, 70
Spinal curvature, 24
Spleen, prolapse of, 42
Strangulation of kidney, 51
Suckling, 21, 66, 133
Suckling's belt, 140
Sudden displacement of kidney, 92
—— —— —— cases of, 93
—— —— —— symptoms of, 92
Suprarenal capsules, effect of movable kidney upon, 42
Surface anatomy of kidneys, 1
Symptomatology, mechanical theory of, 60
—— theory of excessive stimulation of sympathetic nervous system, 60

Symptomatology, toxic theory, 62
Symptoms of movable kidney, depression, 105
—— —— —— disorders of digestion, 107, 138
—— —— —— —— of female sexual organs, 112
—— —— —— —— of male sexual organs, 116
—— —— —— —— of mind, 128
—— —— —— —— of nervous system, 138
—— —— —— fatigue, 102
—— —— —— general, 101
—— —— —— local, 89
—— —— —— loss of weight, 105
—— —— —— lumbar ache, 99
—— —— —— pain, 92
—— —— —— vesical irritability, 99

Tachycardia and movable kidney, 127
—— case of, 127
Technique, special points, 148
Tidey, Stuart, 59, 64
Timme, 62
Toxic theory of insanity, 129
—— —— of symptomatology, 62
Trauma a cause of nephroptosis, 25
Traumatic displacement of kidney, 25
—— —— —— cases of, 26
Treatment after operation, 159
—— of movable kidney, 135, 138
—— —— —— by trusses, belts, etc., 139
—— —— —— by operation, 142
—— —— —— —— indications for, 137
—— methods of, 138
—— necessity for, 137
Treves, Sir Frederick 12
Treves' truss, 140
Tumour of the colon simulating movable kidney, 82
—— of the pylorus simulating movable kidney, 83

Uræmia, definition of, 70
Ureter and pelvis, effect of renal mobility upon, 47
—— effect of obstruction of, 68
—— kinking of, 2
—— upper relations of, 1
Urine, effect of nephroptosis upon, 55, 100
—— method of examining, 65
Urquhart, 129

Vena cava, obstruction of, 40
Vesical irritability a symptom of movable kidney, 99
Visceroptosis, congenital, 10
—— acquired, 10

Weichardt, 71
Weir Mitchell, 119
Wells, 71
Wilkie, 39
Wilson and Howell, 19, 65, 69

X-ray evidence of renal mobility, 79

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